

A MONOGRAPH
OF
THE GENUS DRYOPTERIS

PART I

THE TROPICAL AMERICAN PINNATIFID-BIPINNATIFID SPECIES

BY

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Introduction.

The present work is the first part of a monographical review of the genus of ferns, *Dryopteris*, and it deals with the tropical American species having the lamina from subentire to bipinnatifidly cut. This delimitation is, of course, artificial, as the degree of cutting is of no greater value as systematic character, but it is chosen from practical reasons.

In earlier papers I have published a review of the species belonging to the two subgenera *Lastrea* and *Stigmatopteris*¹⁾. Since the publication of these papers I have received for determination or examination a large number of specimens of species belonging to the two subgenera mentioned; several of these species were previously unknown to me, and some others were found to be undescribed. I have now, therefore, not a few additions to my earlier papers, and as my former keys consequently now are uncomplete, I give in the present work new keys to all known species of the two subgenera. In this work 280 species are dealt with; about 100 of these were treated in detail in my earlier papers.

The systematic grouping of the 280 species into 10 subgenera is entirely new and it is, as to several points, very different from all older classifications. I dare maintain, however, that my classification is the most natural that has been proposed. It is based on a minute examination of not lesser than about 10,000 specimens belonging to about 500 species. Further, the study of that enormous material has enabled me to unravel the real relationship of several critical forms and to get an idea of the value as species of nearly all described "species". Not a few of these were described from very imperfect specimens, and many of them were described in such a way, that it is impossible from the descriptions alone to see, what the form in question may be. If I should, therefore, make myself any hope of clearing the synonymics of several species, it would be necessary to have for examination type-specimens, or, at least authentic specimens of as far as possible all species described. By the kindness of the curators of several collections I have succeeded in obtaining for study original specimens of all described species some few excepted. These original specimens are to be found in various museums and private collections, as follows:

- 1) 1. Revision of the American Species of *Dryopteris* of the group of *D. opposita*. — Kgl. Danske Vid. Selsk. Skr. VII, 4, 1907. A supplement hereto is
2. The American Ferns of the group of *Dryopteris opposita* contained in the U. S. National Museum. — Smithsonian Miscell. Collections (quarterly issue) 52: 365—396. 1909.
3. On *Stigmatopteris*, a new genus of ferns, with a review of its species. — Bot. Tidsskrift 29: 291—304. 1909.

In Muséum d'Histoire naturelle, Paris, are to be found the type-specimens of species described by LAMARCK, POIRET, DESVAUX, FOURNIER and some of those described by FÉE. I paid a visit to the museum in the summer 1909 and found the majority of the type-specimens mentioned. The original specimens of the species described by FÉE in his 5.—10. mémoire sur la famille des fougères were not found there, and I dare not know, where they are.

Prince ROLAND BONAPARTE'S comprehensive herbarium, no doubt the largest private collection in existence, contains numerous authentic specimens; especially are SPRUCE'S South-American collections richly represented. The type-specimens of the species recently described by Dr. ROSENSTOCK from SPRUCE'S collections are in Herb. BONAPARTE, and I have had them for study.

In February 1909 I was at Stockholm, where I found in »Riksmuseets Afdelning för Fossila Växter och Archegoniater« the original specimens of species described by O. SWARTZ a hundred years ago¹⁾. Authentic specimens of not a few of the Swartzian species are to be found in the Botanical Museum of Copenhagen.

On loan I have received from

Kgl. Botanisches Museum, Dahlem bei Berlin, the type-specimens of species described by WILLDENOW, LINK, KLOTZSCH, METTENIUS, KUHN and HIERONYMUS.

The University Museum of Prague, the genera *Nephrodium* and *Lastrea* from PRESL'S herbarium, which besides the original specimens of species described by PRESL also contains several authentic specimens of species described by KUNZE.

The University Museum, Vienna, some original specimens of species described by CHRIST.

Royal Botanic Gardens, Kew, all type-specimens of species described by HOOKER and BAKER, besides several authentic specimens of species described by SODIRO and JENMAN.

Botanisk Museum, Copenhagen, LIEBMANN'S Mexican collections.

New York Botanical Garden, some original specimens of JENMAN'S herbarium, kindly sent to me by Miss MARGARET SLOSSON.

U. S. National Museum, Washington, type-specimens of species described by BRACKENRIDGE, DAVENPORT, DONNELL SMITH, MAXON and JENMAN.

Finally I have received from Dr. H. CHRIST, Basle, and Dr. E. ROSENSTOCK, Gotha, the type-specimens of the species described by these two celebrated pteridologists. From Dr. CHRIST I have received also several authentic specimens of species described by SODIRO.

As it will be seen from the enumeration above there remain only some few type-specimens, which I have not seen. The "species", which I have not seen, are enumerated partly under each subgenus, partly at the end of the work.

¹⁾ See my paper: Über einige Farne in O. Swartz's Herbarium. — Arkiv für Botanik 9¹¹. 1910.

Besides the type-specimens I have had for examination the whole material of the species dealt with, that is contained in the museums of Copenhagen, Stockholm, Berlin, Washington, Herb. PRESL, and the large collections in Herb. ROSENSTOCK and Herb. CHRIST. Dr. CHRIST's very valuable collection of ferns is now incorporated in Herb. ROLAND BONAPARTE, Paris. Smaller collections I have received from Prince BONAPARTE, the museums of Lund, Bruxelles, München and Vienna.

To the curators of the museums enumerated above I owe my most sincere thanks for the kindness they have shown to me by lending me such comprehensive collections for study. My special thanks I must convey to His Highness, Prince ROLAND BONAPARTE, for the great aid I received during my sojourn in Paris, to Dr. H. CHRIST and Dr. E. ROSENSTOCK for numerous courtesies, to Miss MARGARET SLOSSON, New York, and to Mr. W. R. MAXON, Washington, for his most valuable assistance by sending to me the very comprehensive collections from Central America and the West Indies contained in the U. S. National Herbarium. These collections, consisting nearly exclusively of specimens collected during the last twenty years, f. inst. the large collection gathered in Central America by J. DONNELL SMITH and his collectors, are very rich in beautiful and complete specimens.

Finally I beg Dr. C. H. OSTENFELD, curator of the Botanical Museum, Copenhagen, accept my best thanks for his never failing benevolence, without which I scarcely should have got such a large material for examination.

Under each species I quote the specimens seen by me, indicating in a parenthesis where the specimen is to be found. The letters in parenthesis mean:

- B* = Herbarium Berolinense, Berlin.
- RB* = Herb. Roland Bonaparte, Paris.
- C* = Herb. H. Christ, now in Herb. Bonaparte.
- CC* = Herb. Carl Christensen, Copenhagen.
- H* = Herb. Hauniense, Copenhagen.
- Kew* = Royal Botanic Gardens, Kew.
- L* = Herb. Lundense, Lund.
- R* = Herb. E. Rosenstock, Gotha.
- Rg* = Herb. Regnellianum, Stockholm.
- S* = Herb. Holmiense, Stockholm.
- W* = U. S. National Herbarium, Washington.

The 46 figures, illustrating 88 species, are about all illustrations of type-specimens and show, as a rule, a pinna reduced to $\frac{4}{5}$ of its natural size, and two or three segments enlarged $1\frac{1}{2}$.

General Remarks.

The 280 species, dealt with in this work, are grouped into ten subgenera. In a recent preliminary paper¹⁾ I have characterized the subgenera and pointed out the principles, upon which my classification is based. Referring to that paper I shall here remark only, that the kind of the trichomes, the most important character, is not absolutely constant within each subgenus. That character is, like all other characters, not sufficient for basing a natural classification upon it alone, but it is, no doubt, the best and most constant character, by which groups of related species can be distinguished from each other. Against my classification that objection may be made that I, when using a single character as distinguishing mark, cannot omit errors similar to those so evident in all earlier classifications based upon a single character. To this I want to say that my classification is not based upon a single character, the structure of the trichomes. By examining again and again and comparing the thousands of specimens I rather quickly succeeded in being able to group the different forms thus, that the species referred to each group were no doubt intimately related. The affinity is not shown by a single common character, but by a certain conformity in the structure, colour and general habit of the related species. That conformity is easily seen by the trained eye, but it is very difficult to describe. Having sorted my material after that method I then found, that the structure of the trichomes of species referred to a certain group was remarkably alike and on further examination I found, that no other character is so constant as that mentioned. The find was of much value to me, for now it became an easy work to characterize my new subgenera in such a manner, that each pteridologist can refer with approximate accuracy a given form to its right systematic position. As a matter of fact I shall point out that all the 280 species, four or five perhaps excepted, could be determined to subgenus from an examination of the scales and hairs alone.

Qualitatively the ten adopted subgenera are not of exactly the same value. If

¹⁾ On a natural classification of the species of *Dryopteris*. *Biologiske Arbejder, tilegnede Eug. Warming* 3. Nov. 1911, pp. 73—85.

Dryopteris were to be divided into smaller genera, a very natural treatment indeed, the ten subgenera could not all be considered good, natural genera. Such are, in my opinion:

1. *Eudryopteris*.
2. *Stigmatopteris*.
3. *Ctenitis*.

These three are very different from the following and it is in reality highly unnatural to unite them all under a single genus. Intermediate forms with decompound lamina seem to exist between *Stigmatopteris* and *Ctenitis*, but the two groups are as a whole very well defined.

4. *Lastrea*.

Under this fall as specialized groups *Glaphyopteris* and *Steiropteris*; the latter approaches:

5. *Cyclosorus*.

Leptogramma can scarcely be separated from *Cyclosorus* as genus.

6. *Goniopteris*.

A most natural genus, probably also including *Meniscium*.

In the treatment of the single species I have followed the principles, which I have explained in my paper on the group of *D. opposita*. Instead of giving detailed descriptions of all species I have chosen to describe certain central species under each narrower group, while I for all other species have confined myself to point out those characters, by which they differ from their nearest relatives. If the original diagnosis of a species does not mention essential characters, what very often is the case, I add the necessary notes.

My keys are elaborated so detailed as possible. Several species being exceedingly variable I have considered all forms known to me, and, therefore, you will find not rarely the same species occurring twice or even several times in the key.

Finally I shall make a few remarks on the geographical distribution of the species. As previously pointed out by me there are only some few species, which are common to Andes-West-Indian islands and South Brazil. Out of the 280 species the following 14 are common to the two regions:

Eudryopteris: *D. paleacea*, *D. patula*.

Stigmatopteris: *D. rotundata*.

Ctenitis: *D. submarginalis*.

Lastrea: *D. opposita*, *D. oligocarpa*, *D. pachyrachis*, *D. cheilanthoides*.

Glaphyopteris: *D. decussata*.

Cyclosorus: *D. patens*, *D. oligophylla*, *D. mollis*, *D. gongylodes*.

Goniopteris: *D. vivipara*.

The forms of these 14 species occurring in Andes-West-Indian islands and South Brazil respectively are, however, very rarely quite uniform, but, on the other hand, not so different that they can be separated from each other as species. Thus a pronounced difference between the fern-flora of the two regions is clearly seen, but there is also a distinct resemblance, indicating that the whole tropical American flora was in earlier periods not so specialized as in recent times. This resemblance is shown mainly thereby that each of the two regions is inhabited by a long series of species, which are, in the other region, superseded by other, but closely related species. This circumstance can mean that the floristic separation of the two regions took place so long ago, that the species, which were originally common to both regions, have had time to be segregated into several daughter-species, but, on the other hand, the segregation is till now not so far proceeded that separate genera or groups of specially characterized species could have been developed. In every case, such a specialization is in first beginning.

277 species out of the 280 are found in America only. Two, *D. mollis* and *D. gongylodes*, are cosmopolitic within the tropics and subtropics, and one, *D. eriocaulis* from Brazil, is not specifically distinct from the West-African *D. cirrhosa*. It is possible that some others of the South-Brazilian species occur also in tropical West-Africa.

Key to the Subgenera.

1. Lamina without true hairs consisting of a single row of one or some few cells; rhizome, stipe and rachises more or less clothed with scales, which can be very narrow, hairlike. Veins free, at least not regularly goniopteroid or meniscioid. Aërophore none.
2. Costulæ II—III or IV run out from the costa under a very acute angle. Sori with large, reniform, generally persistent indusia. Lamina not pellucido-punctate but often glandular beneath. Most species bipinnate-decompound with furcate veins.

Subgenus 1. *Eudryopteris* (Species 1—11).

2. Costulæ run out from the costæ under an open angle. Sori exindusiate, or (in the section *Peltochlaena*) covered by deciduous, large, peltate indusia. Lamina pellucido-punctate by immersed glands. Most species pinnate-bipinnatifid with simple veins, which do not reach the margin. Apex of pinnæ sharply serrate to the very point.

Subgenus 2. *Stigmatopteris* (Species 12—28).

1. Lamina more or less hairy by true hairs of different structure. Costulæ run out from the costa under an open angle. Veins simple, rarely furcate, free or anastomosing (goniopteroid or meniscioid veins).
2. Hairs articulated, cylindrical, rufous, consisting of 2—4 short cells (unicellular hairs are found in *D. leptosora* and *D. platyloba* only); scales often many, never pubescent, their margins generally more or less dentate or fimbriate (not ciliated by hairs). Veins free, simple or forked, the basal ones not truly connivent to sinus, i. e. their apices do not meet at the sinus. Aërophore none; glandular hairs common. Lamina bipinnatifid-decompound, rarely reduced downwards.

Subgenus 3. *Ctenitis* (Species 29—53).

2. Hairs unicellular or pluricellular (in the latter case they are long, soft and thin, subulate), simple or branched. Scales entire or subentire, seldom many,

often ciliated by simple or branched hairs or pubescent throughout. Lamina pinnatifid-pinnate-bipinnatifid, rarely bipinnate.

3. Veins free, the basal ones run out to the margin above sinus, rarely furcate. Lamina bipinnatifid or bipinnate, often much reduced toward the base, the lower pinnæ being auriculiform or reduced to mere warts along the stipe. Aërophores frequent. Hairs nearly always simple.
4. No keel below the sinus. Sessile glands common.
5. Without aërophores at the base of the secondary veins (costulæ) beneath. Lamina nearly always reduced downwards. Veins not very close. Indusium often present but generally small.

Subgenus 4. *Lastrea* (Species 54—170).

5. Large aërophores at the base of the pinnæ beneath and smaller ones at the base of the secondary veins. Veins very numerous and close, simple. Indusium not seen.

Subgenus 5. *Glaphyopteris* (Species 171—176).

4. A carinate fold (keel) below the sinus extending toward costa, parallel to the secondary veins. Sessile glands none.

Subgenus 6. *Steiropteris* (Species 177—189).

3. Veins free or anastomosing, nearly always simple; the lower basal ones either run to the sinus, more or less connivent, or they are truly united in the leaf-tissue and send a common-branch to the sinus; in the two last subgenera often several pairs of veins are goniopteroid or all meniscioid. Lamina rarely reduced below.
4. Sori round or linear, not confluent. At least the uppermost veins not meniscioid.
5. Hairs simple, at least not branched with 2—6 branches on a short stalk, the scales not furnished with branched hairs.
6. Sori round, as a rule with reniform, persistent, setose indusia. Sporangia glabrous.
7. Lower basal veins run to the sinus, below which is a cartilaginous membrane, that in dried specimens becomes folded and forms a keel running from the sinus toward the costa. All veins free. Aërophores at the base of the pinna frequent; glands none.

Subgenus 6. *Steiropteris* (Species 177—189).

7. Lower 1—4 pairs of veins run to sinus or to a membrane, which scarcely forms a keel but is often protruded beyond the sinus as an apophysis, or the basal pair of veins are united in the leaf-tissue and send an excurrent veinlet to the sinus. Aërophore none; under-surface often glandular.

Subgenus 7. *Cyclosorus* (Species 190—202).

6. Sori oblong or linear, exindusiate; sporangia setose.

Subgenus 8. *Leptogramma* (Species 203—205).

5. Scales always with few or many branched hairs; branched, short-stalked hairs are found also on the rachis and, in some species, also on ribs and leaf-tissue. Veins free or anastomosing, goniopteroid or meniscioid. Lamina often proliferous.
- Subgenus **9. Goniopteris** (Species 206—267).
4. Sori confluent, exindusiate, all veins meniscioid.
- Subgenus **10. Meniscium** (Species 268—280).
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Subgenus 1. *Eudryopteris* C. Chr., Biolog. Arbejder tilegnede Eug. Warming.
p. 76. 1911.

The typical species of this subgenus is our common *D. filix mas*, and most species of *Dryopteris* from the northern temperate region also belong hereto. In tropical America the subgenus is fairly well represented in Mexico, where a series of decomposed forms occur, while South America is poor in species. As I have specimens of all but one known from tropical America, I give here a short review of all species of this subgenus, although I intended to include in the present work the pinnatifid-bipinnatifid species only¹).

Eudryopteris is a very natural group, or, I firmly believe, a distinct, well delimited genus, *Dryopteris* sens. strict. It is well characterized by venation, structure of scales and the total absence of common hairs. The venation is the best character. The veins are free and generally forked; costules (of II.—III. or IV. order) run out from the costa under very acute angles, at first nearly parallel to the costa. By this character the subgenus agrees with *Cystopteris* and I shall in connection herewith call attention to the fact, that certain Mexican forms, which no doubt belong to *Dryopteris*, not rarely have perfectly cystopteroid indusia. Also in pubescence *Eudryopteris* agrees very closely with *Cystopteris*. The scales are thin, entire or fimbriate, consisting of long, narrow often very irregular cells with small lumina and flexuose cell-walls, their margins often glandulose (*paleae cystopteroideae*). The scales of the costæ and veins, if present, are generally very narrow and hairlike, but they consist of 2—3 rows of cells and are therefore scales, not hairs. The leaf of several species is glandulose by short-stalked, capitate glands; the hairs of *D. Karwinskyana* are a peculiar kind of such glands. All species have a short oblique rhizome, which like the fasciculated stipites below is clothed with a dense mass of large, thin, mostly ovate scales. It will be seen from the above that *Eudryopteris* in most characters agrees with *Cystopteris*; the main difference between the two is found in the position and shape of the indusium, but even here we find intermediate forms, as already mentioned above. To me it is probable that *Eudryopteris* and *Cystopteris* are closely allied to each other and that it is unnatural to place them in two different tribes.

¹) A short extract of the review I published in American Fern Journal. 1: 93—97. 1911.

Eudryopteris is not nearly related to the other subgenera of *Dryopteris*. In the lack of simple hairs and in the structure of the scales it agrees with *Stigmatopteris*, but the venation and indusia are very different. Most species of *Eudryopteris* have large, persistent, reniform, often glandulose indusia, while *Stigmatopteris* includes a larger number of exindusiate species and some few species having large, circular, peltate indusia. Some species of *Eudryopteris* resemble closely certain species of *Ctenitis*, but they differ always by venation and lack of articulated, reddish hairs on the costæ above.

Eudryopteris includes, as delimited here, the genus *Dichasium* of A. BRAUN and FÉE and at least partly *Hypodematium* Kunze. Most of the species are large, with a bipinnatifid-decompound, lanceolate or deltoid lamina. In *D. Saffordii* the lamina is narrowed downwards about as in a species of § *Lastrea*. Commonly the leaf is fresh-green above and pale beneath, thick of texture and not rarely coriaceous; still thinly herbaceous forms are also to be found, f. inst. some of the *Cystopteris*-like small Mexican forms.

Key.

1. Lamina bipinnatifid; segments entire or toothed.
 2. Small. Lamina deltoid, thin. Indusium grey. 4. *D. mexicana* (Pr.) C. Chr.
 2. Larger. Lamina lanceolate.
 3. Lamina coriaceous, glandular throughout.
 1. *D. Saffordii*, C. Chr.
 3. Lamina membranous-chartaceous, eglandulose.
 4. Segments rectangular with parallel, entire edges and truncate toothed apex, the upper basal one rarely enlarged and free. Rachis densely chaffy by long glossy scales.
 3. *D. paleacea* (Sw.) C. Chr.
 4. Segments attenuate, toothed throughout, the upper basal one generally enlarged and free. Rachis less scaly.
 2. *D. filix mas* (L.) Schott.
1. Lamina bipinnate-quadripinnatifid.
 2. Indusium flat or absent.
 3. Small species; lamina 10—30 cm. long, pinnæ rarely more than 8 cm. long often 3—5 cm. only. Both surfaces more or less glandular.
 4. Lamina deltoid or ovate-deltoid (the basal pinnæ not conspicuously shorter).
 5. Indusium large, reniform, grey. Surfaces finely glandulose. Most upper pinnæ decurrent; secondary segments or pinnules broad, ovate or oblong, subentire or toothed, the teeth close, rather obtuse 4. *D. mexicana* (Pr.) C. Chr.
 5. Indusium small, brown or absent. Both surfaces densely glandulose. Pinnæ not decurrent; secondary segments or pinnules narrow, linear, sharply and remotely toothed.
 5. *D. glandulifera* (Liebm.) C. Chr.

4. Lamina lanceolate (basal pinnæ shorter).
 5. Sori not close to the secondary veins; stipe reddish; segments unequal-sided, more deeply cut on the anterior side. Underside paler..... 7. *D. indecora* (Liebm.) C. Chr.
 5. Sori in two rows close to the secondary vein; stipe stramineous; segments equal-sided, deeply cut on both sides. Both surfaces concolorous 6. *D. cinnamomea* (Cav.) C. Chr.
3. Large species. Lamina often 50 cm. or more long, pinnæ 10—25 cm.
 4. Indusium persistent 8. *D. patula* (Sw.) Und.
 4. Indusium absent 9. *D. ulbensis*, Hieron.
2. Indusium very large, coriaceous, hemispherical, perfectly concealing the sporangia.
 3. Surfaces not mealy-glandular. Leaf with age coriaceous, the segments broad 10. *D. Maxoni*, Und. et C. Chr.
 3. Both surfaces densely mealy-glandular. Leaf thinner, finely cut.
 11. *D. Karwinskyana* (Mett.) O. Ktze.

1. *Dryopteris Saffordii* C. Chr. Amer. Fern Journal 1: 94, 1911.

Type from Peru, mountains back of Lima, Arroyo Railway, leg. WILLIAM E. SAFFORD III/1892, nr. 994 (W).

Eudryopteris rhizomate ignoto. Stipitibus brevibus, 7—8 cm. longis, stramineis, squamis ovatis, pallide-luteis, tenuibus sparse instructis. Lamina lanceolata, 30 cm. longa, medio 10 cm. lata, versus basin attenuata, papyracea vel coriacea, infra pallida, bipinnatifida, rachi straminea superne sulcata minute glandulosa et sparse squamosa. Pinnis oppositis, sessilibus, attenuatis, acutis, mediis 5 cm. longis, 1—1½ cm. latis, inferioribus sensim reductis, magis remotis, infimis 2 cm. longis, utrinque minute glandulosis, ad alam 1 mm latam pinnatifidis. Laciniis obliquis, triangularibus, acutis, leviter serratis, basali acroscopica longiore et latiore, subpinnatifida. Venis immersis, indistinctis, saepe furcatis, 3—4 jugis. Soris majusculis, medialibus; indusiis reniformibus, persistentibus, rufis, minute glandulosis.

A near relative of *D. filix mas*, different by the less cut lamina, which is nearly coriaceous and densely viscid throughout by minute, glossy glands.

2. *Dryopteris filix mas* (L.) Schott.

Our common European Male Fern is widely distributed in North America, from New Foundland to Greenland and Alaska, south to Michigan and South Dakota and along the Rocky Mountains and the Pacific coast to Arizona and Mexico. It varies in North America quite as much as in Europe, and some of the European forms are also to be found in America. I shall not here try to name and describe the different forms, but only mention that some of the forms of the Rocky Mts. differ not a little from the type. Thus a peculiarly looking variety is found in Washington (SUKSDORF nr. 1230, W) and a large-growing tripinnatifid variety, which

closely resembles the var. *affine* (Fisch. and Mey.), occurs in the Rocky Mts. (Montana, Idaho), where rather typical forms also are met with (Utah, New Mexico, Arizona, California).

In Mexico, where the following species is frequent, true *D. filix mas* is rare; the specimens referred here belong to a form, which approaches the following species, but it does not differ from *D. filix mas* in the main characters. This Mexican form varies considerably in the degree of cutting, from merely bipinnatifid to deeply tripinnatifid. Very large specimens collected by SCHAFFNER (B, without exact locality) are not unlike the subspecies *elongata* (Sw.) and belong perhaps to a distinct variety.

State of Mexico: Nevada de Toluca, J. N. ROSE and PAINTER nr. 7944 (W).

State of Oaxaca: Sierra de San Felipe, CHARLES L. SMITH nr. 2076 (W).

State of Puebla: Ixtaccihuatl, 2610 m., F. NICOLAS nr. 5550 (RB).

3. *Dryopteris paleacea* (Sw.) C. Chr. Amer. Fern Journal 1: 94, 1911.

Syn.: *Aspidium paleaceum* Sw. Syn. 52, 1806; Fourn. Mex. pl. 1: 92, 1872.

Aspidium parallelogrammum Kze. Linnaea 13: 146, 1839.

Dichasium parallelogrammum Fée, Gen. 302 tab. 23 B fig. 1. 1850—52.

Aspidium resp. *Nephrodium filix mas* var. *parallelogrammum* resp. *paleaceum* auctt. plur.

Aspidium crinitum Mart. et Gal. Mém. Ac. Brux. 15: 66 tab. 17, fig. 2, 1842.

Aspidium Pseudo-Filix-mas Fée, 8 mém. 103, 1857.

Aspidium chrysocarpon Feé, 8 mém. 103, 1857.

Type from PERU (LAGASCA). Not seen.

It is beyond question that *A. paleaceum* Sw. is identical with *A. parallelogrammum* Kze. from Mexico, leg. KARWINSKY (B!). The specific name has been attributed to DON, who under that name described a similar form from Himalaya (Prod. Fl. Nepal. 4, 1825), which is *A. patentissimum* Wall.

In treating this widely distributed American fern as a species, which by most authors is referred to *D. filix mas* as a variety, I have several reasons for doing so. It is very often identified with Central-Asiatic forms of *D. filix mas*, especially with the varieties *patentissima* and *fibrillosa* Clarke; I have, however, never seen Asiatic forms, which entirely agree with the American one. *D. paleacea* is a rather uniform species, which constantly differs from *D. filix mas* by the following characters: 1) Stipe and rachis very densely clothed with 1—2 cm. long, narrow, blackish or reddish, glossy, divaricating scales, 2) lamina always bipinnatifid, never bipinnate, 3) pinnæ not widened at base, long acuminate and sharply serrated to the very apex, the lower ones, which are somewhat reduced, not subdeltoid, 4) segments with parallel, entire or very faintly toothed edges, the apex truncate with 3—5 short teeth, the basal ones not enlarged and lobed (still often with an interne auricle), rarely free, 5) texture chartaceous or coriaceous. — The indusium is large and often biscutelloid (as FÉE termed it), which is especially the case in the an-

dine specimens. It is not fixed exactly in the centre; the sinus extends over the middle and reaches nearly a shallow sinus on the opposite side of the indusium, thus the indusium appears to be cleft into two halves. FÉE's figure (Gen. Fil. tab. 23 B) gives a good illustration of an extreme form. A. BRAUN founded a new section *Dichasium* on this character (Flora 1841: 710), and FÉE considered it being of generic value. I can not at all agree in this; in young specimens the indusium are of the common *filix-mas* type, but growing older it is cleft, before falling, in the said manner. Still it seems to be a good specific character.

D. paleacea varies in size and colour of the scales but is otherwise fairly constant. It is apparently not rare in the Andes from Mexico to Peru and Bolivia; it is found at high mountains of Jamaica and Haïti, and again in Southern Brazil. The Hawaiian plant referred hereto, *Lastrea truncata* Brack., is scarcely identical.

I have seen the following specimens:

- San Domingo: infra Valle nuevo, 1900 m., EGGERS nr. 2306 (B).
 Jamaica: Summit of Blue Mountain Peak, MAXON nr. 1411 (W = UNDERWOOD nr. 2541); W. HARRIS nr. 7486 (W); HART nr. 670 (W).
 Mexico: Valle de Mexico, SCHAFFNER nr. 85 (B), HARTWEG nr. 570 (B), UHDE nr. 180 et 236 (B) — Forêt de San Nicolas, BOURGEOU nr. 1041 (B, H, W) — Pico de Orizaba, LIEBMANN nr. 2393 (H) — Oaxaca, GALEOTTI nr. 6348 (B = *A. crinitum* M. et G.) — EHRENBERG (B = *A. parallelogrammum* Kze. — Hidalgo, Trinidad, PRINGLE nr. 8750 (B, H, W) — Ixtaccihuatl, C. A. PURPUS nr. 10 (W) — Oaxaca, Cerro de San Felipe, C. GONZATTI and V. GONZALEZ nr. 530 (W) — Chiapas, San Cristobal, COLLINS and DOYLE nr. 136 (W).
 Guatemala: Volcan de Agua, 33—3600 m., MAXON and HAY nr. 3712 (W) — Depart. Quiché, San Miguel Uspantán, 6000', HEYDE et LUX, ed. DONN. SMITH nr. 3244 (W).
 Costa Rica: Forêts de Barba, PITTIER nr. 1933 (B, W) — Cerro de Las Vueltas, PITTIER nr. 10604 (W) — El Paramo, PITTIER nr. 10621 (W) — forêts de Copey, 2670 m, TONDUZ nr. 11800 (W) — J. J. COOPER (W).
 Panama, MAXON nr. 5275 (W).
 Colombia, HARTWEG nr. 1512 (B) — Boqueron-Bogotá, STÜBEL nr. 457 (B) — Bogotá, KARSTEN (B).
 Venezuela, prov. de Pamplona, FUNCK et SCHLIM nr. 1372 (RB, L).
 Peru, DOMBEY (B), RUIZ (B, W), Agapata, LECHLER nr. 2020 (B).
 Bolivia, MANDON nr. 71 (B) — Tunari Mts., O. KUNTZE (B) — M. BANG nr. 1784 (B, W).
 Argentina: Sierra de Tucuman, P. G. LORENTZ (B).
 Brazil: Rio, GLAZIOU nr. 4432, 7333 (B, H) — E. BRUNET nr. 53 (B) — Serra de Itatiaia, P. DUSÉN nr. 428 (Rg, W) — Theresopolis, TH. DE MOURA nr. 60 (B) — Minas Geraes, Caldas, Regnell nr. III 1451 b (B, Rg, W); MOSÉN nr. 2180 (H, Rg).

4. *Dryopteris mexicana* (Pr.) C. Chr. comb. nov. — Fig. 1.

Syn.: *Nephrodium mexicanum* Pr. Rel. Haenk. 1: 38, 1825 (non auctt.).

Aspidium flaccidum Fourn. Bull. Soc. Fr. 27: 328, 1880.

Nephrodium Fournieri Bak. Ann. Bot. 5: 317, 1891.

Dryopteris Fournieri C. Chr. Ind. 266, 1905.

The type-specimen of this species was collected in Mexico by HAENKE. I have seen in Herb. PRESL a single leaf labelled: "*Nephrodium mexicanum* Presl, rel. haenk. I: In Mexico (Hænke)", which I regard as typical. It does not agree with the forms generally referred to *D. patula* v. *mexicana*, but it is not essentially

from *A. flaccidum* Fourn., based on SCHAFFNER nr. 85, 1877, San Luis Potosi (herb. Paris!). PRINGLE nr. 11773 from Eslaba, Federal District, is probably the same. The species is perhaps not different from *D. cinnamomea*, with which it agrees by its small size, thin texture and large, grey indusia; it differs mainly by its deltoid lamina, lanceolate scales of the stipe and the less cut lamina; most pinnæ are decurrent in a narrow wing to the rachis, and only the basal pinnules of the lower pinnæ are free.

5. *Dryopteris glandulifera* (Liebm.)

C. Chr. Ind. 267. 1905.

Syn. *Polypodium glanduliferum* Liebm.

Vid. Selsk. Skr. V. 1: 206. 1849.

Mexico, inter Comaltepec et Trapiche de la Concepcion, Dep. Oajaca, leg. LIEBMANN nr. 2395 (H, type). — Morelos, Cuernavaca, H. Ross nr. 287 (CC).

Perhaps a small form of the large *D. patula* var. *Rossii*. In the specimens leg. Ross indusia are clearly seen. The species resembles very much *D. hirta* and allied species of *Ctenitis*, but the venation and pubescence is that of *Eudryopteris*.

6. *Dryopteris cinnamomea* (Cav.) C. Chr. Amer. Fern Journal 1: 95. 1911.

Syn. *Tectaria cinamomea* Cav. Descr. pl. 252. 1802.

Aspidium athyrioides Mart. et Gal. Mém. Ac. Brux. 15: 67 tab. 18. 1842.

Dryopteris athyrioides O. Ktze. Rev. 2: 811. 1891; C. Chr. Ind. 253.

Athyrium sphaerocarpon Fée, Gen. 186. 1850—52; Fourn. Mex. pl. 1: 101.

Nephrodium sphaerocarpon Hk. spec. 4: 139. 1862; Hk. Bak. Syn. 277.

Aspidium agatolepis Fée, 8. mém. 106. 1857.

Aspidium mexicanum Kze. Linn. 13: 147 (ex descr.).

?*Polystichum cystopteroides* Nees, Linn. 19: 685.

Type from Mexico: Chalma, leg. Luis Née (fragment in Herb. Sw. S!).

In Ark. för Bot. 9¹¹: 43 I have said that *T. cinnamomea* Cav. probably is the same as *Asp. athyrioides* M. et G.; now I have no doubt that the two names are synonyms. I add here the original description of *T. cinamomea* Cav.

Tectaria cinamomea foliis tripinnatis glabris, foliolis linearibus acutis: fructificationibus solitariis. †

La planta es lampiña; los peciolos delgados, amarillentos; las hojas de color de canela tres veces pinadas, de un pie de largo con mas de medio de ancho, sin contar los peciolos; las hojuelas son estrechas, de dos á quatro líneas de largo,

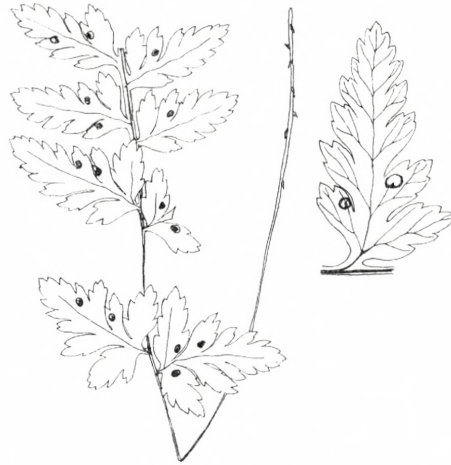


Fig. 1. *D. mexicana* (Pr.) C. Chr. Part of the type-specimen of *A. flaccidum* Fourn. $\times \frac{4}{5}$, and pinna $\times 1\frac{1}{2}$.

terminadas en una puntita. Las fructificaciones solitarias en dos líneas inmediatas al nervio principal de las pínulas secundarias. Los puntos son redondos como igualmente sus tegumentos. Don Luis Née la encontró junto á Chalma, pueblo de la Nueva-España.

The best character of the species, the position of the sori, was clearly described by CAVANILLES. FÉE renamed the species of MARTENS and GALEOTTI, referring it to *Athyrium*, because the indusium is sometimes subhippocrepiform. *A. agatolepis* is the same according to specimens so named by FOURNIER (BOURGEAU nr. 1164). *D. cinnamomea* is exclusively a Mexican species and is very variable. The typical form can shortly be described thus: Rhizome oblique, like stipe densely clothed with large (up to 2 cm. long), ovate-acuminate, concolorous, red-yellow, thin and glossy, entire scales. Stipe stramineous, 10—15 cm. long. Lamina lanceolate or subdeltoid, firmly herbaceous or membranous, without hairs but more or less finely glandular on both sides by minute, glossy, whitish glands, especially on the costæ beneath, fully tripinnate, about 20 cm. long by 10 cm. broad; the pale rachis and the green costæ beneath with some few small scales. Pinnæ opposite, the lower somewhat shortened, the longest 5—8 cm. long, 2—3 cm. broad, deltoid-oblong, mostly equal-sided or somewhat reduced on the lower side at base. Pinnules oblong or subdeltoid, the lower ones free, the upper decurrent; free pinnules equal-sided, fully pinnate at base; segments III entire or toothed, acute, ascending. Veins indistinct, forked in the segments. Sori nearly always solitary in the segment close to the secondary midrib, furnished with a large, flat, greyish, finely glandulose indusium, which is as a rule truly reniform but sometimes subhippocrepiform. In mature leaves the indusium appears often to be lateral (*cystopteroid*), because the sporangia come out at one side only, viz. that opposite the sinus.

This typical form seems to be well-marked and not easily to confound with the much larger and less finely cut *D. patula mexicana*; the best characters are the position of the sori and shape of indusium, the equal-sided free, lower pinnules and the finely glandular surfaces. — The following specimens seen are typical:

Mexico: State of Mexico, near Toluca, J. N. ROSE and PAINTER nr. 6807 (W) — Durango, Tejamén, EDW. PALMER nr. 506 (W) — Hidalgo, Sierra de Pachuca, PRINGLE nr. 13815 (H, W) and J. N. ROSE and PAINTER m. 6745 (W) — Morelos, Sierra de Tepoxlan, ROSE and PAINTER nr. 7257 (W) — Michoacan, hills of Patzuaró, PRINGLE nr. 3362 (W) — Chihuahua, Arroyo Ancho, Sierra Madre, PRINGLE nr. 1445 (W), 1712 (S) — Barranca de Santa Fé, BOURGEAU nr. 1164 (H) — Montezuma près Cuantepec, BOURGEAU nr. 1165 (H).

7. *Dryopteris indecora* (Liebm.) C. Chr. Ind. 272. 1905.

Syn. *Lastrea indecora* Liebm. Vid. Selsk. Skr. V. 1: 272. 1849.

Aspidium indecorum Fourn. Mex. pl. 1: 97. 1872.

Aspidium inquinans Fée, 8 mém. 106. 1857 (teste FOURNIER).

Mexico, Yavesia, Dep. Oajaca, 7—7500 ft., leg. LIEBMANN nr. 2417 (H!)

A very doubtful species based on three imperfect leaves. It may be a form of *D. cinnamomea*. HIERONYMUS describes (*Hedwigia* 46: 346. 1907) a var. *obtusa* from Colombia, STÜBEL nr. 110, which I have not seen.

8. *Dryopteris patula* (Sw.) Und. Our nat. Ferns ed. IV. 117. 1893.

Syn. *Aspidium patulum* Sw. Vet. Akad. Handl. 1817: 64.

Lastrea polystichoides Pr. Epim. 38. 1849!

Aspidium imbecile Kze.; Ettingsh. Farnkr. tab. 107, fig. 10, tab. 109 f. 1. 1865!

Type from Brazil: Minas Geraes, leg. FREYREISS (S!).

To this species I refer a long series of forms, several of which are no doubt good species. The Brazilian type is thin-leaved, finely glandular throughout, the under-surface not much paler than the upper one; pinnæ about equal-sided, the pinnules more deeply lobed on the anterior side, the segments broad, shallowly toothed; indusium rather small, reddish, densely glandulose.

Minas Geraes: Caldas, MosÉN nr. 2183 (H) — Serra da Piedade, WARMING nr. 871 (H). — GLAZIOU nr. 15759 (H).

Best agreeing with the type is a plant from Jamaica, HART nr. 153 (W). It is smaller and densely glandular throughout.

In Mexico and the Andes southwards a number of forms occur, which are described under several names but which I have failed to distinguish with certainty. The nomenclature is very confuse. Most authors refer the different forms to a single species, *D. patula* or *Nephr. mexicanum*; as shown above I believe that PRESL's species is the same as *Asp. flaccidum* Fourn. and probably specifically different from *D. patula*. I shall mention some of the more characteristic forms.

1. Very near the Brazilian type, but larger; pinnæ up to 25 cm. long, like the pinnules unequal-sided at base; surfaces slightly glandulose, the indusia large, flat, often peltate, finely glandular. Here I refer:

Aspidium paupertinum Kze. Linn. 18: 345. 1844, and

Aspidium apertum Fée, 8 mém. 106. 1857;

Dryopteris aperta C. Chr. Ind. 252. 1905.

Mexico: Oajaca, inter Comaltepec et Trapiche de la Concepcion, LIEBMANN nr. 2404 (H) — Orizaba, Izhuatlantillo, BOURGEAU nr. 2360 (H).

Aspidium leptorachis Kze. Linn. 18: 346. 1844 is evidently a less cut form of the same. The short, obtuse pinnules are deeply serrated, scarcely pinnatifid. *Aspidium roseum* Fourn. Mex. pl. 1: 97. 1872 is probably also belonging here.

2. var. *chaerophylloides* (Moritz) Bak. Syn. 276.

Like the preceding form, but surfaces and indusia not glandulose. It varies in size and cutting.

Guatemala: Alta Vera Paz, Cubilquit, v. TUERCKHEIM ed. DONN. SMITH nr. 8643, 8645 (W) — Jalapa, Laguna de Ayarza, HEYDE et LUX ed. DONN. SMITH nr. 4081 (W) — Alta Vera Paz, Coban, v. TUERCKHEIM, ed. DONN. SMITH nr. 703 (W); v. TUERCKHEIM nr. II 1370 (W) — Dept. Santa Rosa, Sambrerito, HEYDE et LUX ed. DONN. SMITH nr. 6408 (W).

Nicaragua: Ile d'Omotépé, LÉVY nr. 207 (H).

Costa Rica: Bords du Río Torres à San José, TONDUZ nr. 9791 (W) — Haie près San José, TONDUZ 9780 (W) — Haies à la Verbena près Alajuelita, TONDUZ nr. 8790 (W) — Alajuela, ALFARO ed. DONN. SMITH nr. 6031 (W) — Alto del Sacatal, PITTIER nr. 10547 (W) — San José, BIOLLEY nr. 102 (C, CC, H, W) — Tablazo, BIOLLEY nr. 74 (C, CC, W).

Colombia: Santa Marta, H. H. SMITH nr. 1038 (Rg).

Ecuador: Niebly, SODIRO (RB).

var. **Rossii**, n. var.

Under the name *D. Rossii* I have described a Mexican fern as a new species after specimens collected in Morelos: Cuernavaca, Santa Maria by H. ROSS nr. 279 (Herb. Munich, CC); my description is till now not published. Comparing my specimen with several other specimens from Mexico I fear that my proposed new species cannot be distinguished specifically from the Mexican form of *D. patula*, *Aspid. apertum* Fée, although the typical form looks very distinct. It differs by the deeply cut lamina, which is distinctly glandular on both surfaces, by its very unequal-sided pinnæ and pinnules, and especially by its narrow, toothed segments; under surface pale or even glaucous; stipe and rachis reddish, clothed with narrow scales. Indusium small, reddish. — The lamina is generally deltoid in outline, firm. — This is nearly exactly a *D. glandulifera* on an enlarged scale, — the basal pinnæ are up to 15 cm. long — and it also comes near to certain forms of *D. cinnamomea*, from which it differs by its larger, deltoid lamina, pale-green underside, position of sori and unequal-sided pinnules.

Mexico: State of Mexico, Hac. de la Encarnacion, ROSE and PAINTER nr. 8477 (W); near Tultenango, ROSE and PAINTER nr. 7861 (W) — Puebla, Ixtaccihuatl, 2160 m. F. NICOLAS nr. 5549 (RB) — Jalisco, near Guadalajara, EDW. PALMER nr. 288 (W), ROSE and PAINTER nr. 7319 (W); Rio Blanco, EDW. PALMER nr. 149 (W); between Colotlan and Bolanos, J. N. ROSE nr. 2837 (W) — Morelos, Cuernavaca, H. ROSS nr. 279 (CC) — Michoacan, Mt. Patamban, E. W. NELSON nr. 6590 (W); Patzcuaro, PRINGLE nr. 3362 (W); near Morelia in different localities, F. ARSÈNE (RB).

Arizona: Huachuca Mts., Conservatory Canyon, Lemmon (W) — (A small form near *D. glandulifera*).

9. *Dryopteris ulvensis* Hieron. Hedwigia 46: 346 tab. 7 fig. 18. 1907.

Type from Ecuador, in valle Pastaza, STÜBEL nr. 848 (B).

This I have not seen. It is certainly closely allied to *D. patula* but is described as exindusiate.

10. *Dryopteris Maxoni* Underw. et C. Chr. Amer. Fern Journal 1: 96. 1911.

Type from Mexico: Morelos canyons above Cuernavaca, 5500 ft., leg. PRINGLE nr. 6190 (W! also S). —

Other specimens seen: type locality, J. N. ROSE and PAINTER nr. 6920 (W); Tlatzalan bei Tepotzlan, Morelos, C. et E. SELER nr. 4518 (B) — Michoacan: Coru Station, PRINGLE nr. 8846 (S, W) — Jalisco: near Etzatlan, ROSE and PAINTER nr. 7597 (W) — Very numerous specimens were collected in different localities near Morelia by J. ARSÈNE (RB, CC).

Eudryopteris rhizomate crasso, obliquo, sparse squamoso. Stipitibus crassis, stramineis, 3—4 dcm. longis, teretibus, squamis integris, ovatis, siccis, pallidis (vel in centro atrofuscis) sparse instructis. Lamina deltoidea vel deltoideo-ovata vel ovato-lanceolata, 4—6 dcm. longa, chartacea vel coriacea, pallide viridi, pilis omnino destituta, ad rachin costasque infra squamis pallidis, parvis onusta, bipinnata-

tripinnatifida. Pinnis suboppositis, parum erectis, basalibus subovatis vix abbreviatis, medialibus a basi ad apicem acutum attenuatis, omnibus breviter petiolatis equilateralibus, maximis ad 15 cm. longis, Pinnulis remotis, equilateralibus, inferioribus liberis basi contractis, medialibus decurrentibus superioribus confluentibus, fere ad costulam pinnatifidis. Laciniis oblongis integris vel ad apicem truncatum saepe dentatis. Venis furcatis. Soris 1—2 in lacinia; indusiis magnis, coriaceis, hemisphaericis, reniformibus, minute glandulosis.

A very distinct species, well-marked by the very large, coriaceous, hemispherical indusia, which perfectly conceal the sporangia. By this character it resembles *D. Karwinskyana*, which is quite different in habit and pubescence. — Very characteristic are the thick, straw-coloured, somewhat fleshy stem and rachis.

11. *Dryopteris Karwinskyana* (Mett.) O. Ktze. Rev. 2: 813. 1891;
C. Chr. Ind. 272.

Syn: *Aspidium Karwinskyanum* Mett. Aspid. nr. 141. 1858.

Lastrea mexicana Liebm. Vid. Selsk. Skr. V. 1: 272. 1849.

A most distinct species with a finely cut, thin lamina, which throughout is covered by unicellular, cylindrical, hairlike glands. The sori are hemispherical and conceal the sporangia.

Mexico: Comaltepec, Dept. Oajaca, LIEBMANN nr. 2396 (H).

Guatemala: Dept. Santa Rosa, Río de los Esclavos, HEYDE et LUX ed. DONN. SMITH nr. 4426; Mataquesuintla, HEYDE et LUX ed. DONN. SMITH nr. 6405 (W).

Nicaragua: Ile d'Omotépé, LÉVY nr. 132 (H).

Unknown species of uncertain position.

Dryopteris Wolfii Hieron. Hedwigia 46: 344 tab. 7 fig. 17. 1907.

Type from Ecuador, STÜBEL nr. 770, 919 et 998 (B).

By the author compared to *D. marginalis*, but the description and the figure do not agree perfectly with the characters of *Eudryopteris*.

Aspidium Huberi Christ, Hedwigia 45: 192. 1906.

Type from Amazonas, Alto-Purus, HUBER nr. 4514.

Subgenus 2. *Stigmatopteris* C. Chr. Bot. Tids. 29: 292. 1909 (as genus).

In 1909 (loc. cit.) I proposed to refer to a proper genus, *Stigmatopteris*, a number of tropical American ferns, which show several characters by which they differ from species of *Dryopteris*: the lack of simple hairs, the serrated apex of the pinnæ, the pellucido-punctate lamina and the peculiar venation, the veins

terminating in the leaf-tissue in a clavate apex, not reaching the margin and, in some species, irregularly anastomosing. In lack of simple hairs and in the structure of the scales *Stigmatopteris* resembles *Eudryopteris*, but the venation and the exindusiate sori are quite different. I am fully convinced that *Stigmatopteris* is a very natural genus (perhaps even not a member of the *Dryopterideae*), but as the same can be said of several other subgenera of *Dryopteris* dealt with in this paper it is best for the sake of uniformity of treatment to place *Stigmatopteris* here among the other subgenera.

Since the publication of my paper on *Stigmatopteris* I have seen some other species, which belong here. It is very interesting to note that some of these species are indusiate, but the indusia are not reniform as in *Dryopteris* but peltate, large and circular, fixed at the centre, as a rule coriaceous and glabrous, the edges often upcurved. Species with such indusia have commonly been referred to *Polystichum*, but there exists no species of true *Polystichum* having a similar habit. In general habit the species here in question do not differ from *Stigmatopteris rotundata* and allied species, and as to all other characters they fully agree, *inter alia* also in the variable venation and in the presence of immersed glands. FÉE has named provisionally a plant from Guiana *Peltochlaena nephrodiiformis*, which no doubt belongs here. I can not say definitely what his species may be, but I use here his name *Peltochlaena* for a section of *Stigmatopteris* including those species having peltate indusia. It must be remembered that the very large indusia soon fall, and a fertile leaf with all indusia fallen could as well be referred to *Eustigmatopteris*.

The genus (subgenus) thus can be divided into two groups:

1. **Eustigmatopteris**. Sori exindusiate. Leaves as a rule thin.
2. **Peltochlaena** (Fée). Sori furnished with large, circular, peltate indusia. Leaves generally papyraceous to coriaceous.

In my former paper I have exclusively dealt with the species of the former group and I have there mentioned and illustrated 12 species. Since then I have examined the type-specimens of some species described by HOOKER and BAKER, and the number of species known to me is now 17, which are all enumerated below and arranged in a key. For descriptions, synonymy and distribution of the 12 species I refer to my former paper.

Key.

1. Sori exindusiate. Lamina of most species herbaceous or membranous. **Eustigmatopteris.**
2. Pinnæ nearly entire, serrated or lobed not more than $\frac{1}{2}$ of the way down to the midrib, seldom a little more.
3. Sori round, not confluent; veins free.
4. Only the uppermost pinnæ with a shortly decurrent base.

5. Pinnæ linear, slightly lobed; lobes broader than long, oblique, as a rule faintly crenulate or obtusely dentate. Veins 2—5.
6. Veins short. Pinnæ not or shortly auricled at the upper base.
7. Pinnæ 25 cm. long by $2\frac{1}{2}$ cm. broad; veins 4—5-jugate, rather patent; sori medial 12. *S. rotundata* (Willd.) C. Chr.
7. Pinnæ 12—18 cm. long by $1\frac{3}{4}$ —2 cm. broad; veins 2—4-jugate, more erect, often very short and distant; sori near the midrib 13. *S. Carrii* (Bak.) C. Chr.
6. Veins longer, ascending. Pinnæ with a large, broad auricle.
27. *D. sancti gabrieli* (Hk.) C. Chr.
5. Pinnæ linear or lanceolate, lobed $\frac{1}{3}$ — $\frac{1}{2}$ of the way down; lobes generally longer than broad. Veins 5—7 jugate.
6. Pinnæ lanceolate, 12—18 cm. long, 3 cm. broad, with close, entire, falcate lobes. Veins 6—7-jugate. Light-green 14. *S. tijuccana* (Raddi) C. Chr.
6. Pinnæ linear or lanceolate with more or less repand or dentate lobes. Colour dark-green.
7. Pinnæ narrow-linear; lobes patent with open sinuses between. Veins about 5 to a side. Sori inframedial. Immersed glands very large. Brazil.
15. *S. prionites* (Kze.) C. Chr.
7. Pinnæ linear-lanceolate, broadest at the middle; lobes falcate, rather close. Andine species.
8. Sori medial without paraphyses. Lobes falcate, more or less dentate 16. *S. nephrodioides* (Kl.) C. Chr.
8. Sori inframedial with articulated paraphyses. Lobes narrow, falcate, repand 17. *S. Michaëlis* (Bak.) C. Chr.
4. Most pinnæ with a long decurrent base, those of the upper third of the leaf connected by a broad wing to the rachis.
5. Pinnæ deeply lobed with narrow, repand lobes.
17. *S. Michaëlis* (Bak.) C. Chr.
5. Pinnæ subentire, serrate or slightly lobed.
6. Pinnæ approximate, linear, serrate, about 15 cm. long, $2\frac{1}{2}$ cm. broad 18. *S. longicaudata* (Liebm.) C. Chr.
6. Pinnæ distant, about 15 cm. long, 3—4 cm. broad, subentire or irregularly crenate or slightly lobed; veins frequently anastomosing 19. *S. alloëoptera* (Kze.) C. Chr.
3. Sori confluent; venation meniscioid 20. *S. opaca* (Bak.) C. Chr.
2. Pinnæ incised to a narrow wing to the costa, or lamina bipinnate-tripinnatifid. Veins often furcate.
3. Lamina bipinnatifid with toothed or lobed segments.
4. Sori without indusium-like, inferior scale.
5. Segments generally toothed throughout, separated by broad, open sinuses, somewhat contracted above the widened base, 5—7 mm. broad. Lower basal segment of most pinnæ considerably reduced. Brazil 21. *S. caudata* (Raddi) C. Chr.
5. Segments close, up to 1 cm. broad, sharply toothed at their apex, the edges entire or faintly crenate. Lower basal segment scarcely abbreviated. Andes 24. *S. pellucido-punctata* C. Chr.
4. Most sori with an inferior, indusium-like scale; Andine and West Indian species.

5. Lower basal segment of most pinnæ abbreviated. Segments patent or oblique, not contracted above their base; costæ and costulæ beneath rather scaly 22. *S. ichtiosma* (Sod.) C. Chr.
5. Basal segments both much enlarged; sterile leaf tripinnatifid, fertile one with narrow, crenate segments; costæ beneath sparsely scaly 23. *S. contracta* (Christ) C. Chr.
3. Lamina bipinnate with lobed pinnulæ. 25. *S. prasina* (Bak.) C. Chr.
1. Sori furnished with large, circular, peltate indusia, which are deciduous and often not found. **Peltochlaena.**
2. Veins anastomosing about as in *Goniopteris*. Pinnæ irregularly cut, subentire or deeply lobed 26. *D. varians* (Fée) O. Ktze.
2. Veins free. Pinnæ regularly serrulate or lobed.
3. Lamina membranous. Pinnæ 15—20 cm. long, broadly and shallowly serrate with a broad auricle at the upper base. 27. *D. sancti-gabrielii* (Hk.) C. Chr.
3. Lamina coriaceous. Pinnæ 10—12 cm. long, lobed about halfway down to the midrib, scarcely auricled 28. *D. subobliquata* (Hook.) O. Ktze.

Group 1. **Eustigmatopteris** (species 12—25).

12. **Stigmatopteris rotundata** (Willd.) C. Chr. Bot. Tids. 29: 297 fig. 2. 1909.
Area: Lesser Antilles from Montserrat to Trinidad. South Brazil.
Nephrodium Imrayanum Hk. spec. fil. 4: 86. 1862 from Dominica, IMRAY (Kew!) is exactly this species. The specimen is absolutely exindusiate.
13. **St. Carrii** (Bak.) C. Chr. l. c. 298 fig. 3.
Area: Brazil.
The type-specimen from Rio, leg. CARR (Kew!) shows that I have rightly understood this species, which is perhaps not specifically different from *S. rotundata*.
Aspidium brachyneuron Fée, Cr. vasc. Brés. 1: 133. 1869 from Bahia, BLANCHET, is probably this species.
14. **St. tijuccana** (Raddi) C. Chr. l. c. 298, fig. 4.
Area: Brazil, Rio-S. Paulo.
15. **St. prionites** (Kze.) C. Chr. l. c. 298, fig. 5, 6.
Area: Brazil. — *Phegopteris Ulei* Christ, Bull. L'Herb. Boiss. II. 2: 634. 1902; *Dryopteris Ulei* C. Chr. Ind. 299 from S. Catharina, ULE nr. 70, is probably a form of this species.
16. **St. nephrodioides** (Kl.) C. Chr. l. c. 299, fig. 8.
Area: Venezuela - Costa Rica.

17. *St. Michaëlis* (Bak.) C. Chr. l. c. 300, fig. 9.

Area: Ecuador-Colombia.

Additional synonyms: *Polypodium sylvicum* Bak. Journ. Bot. 1881: 205.
Dryopteris sylvicola C. Chr. Ind. 297, 1905.

The type-specimen of *P. sylvicum* Bak. from Colombia, Prov. Antioquia, KALBREYER nr. 1807 (Kew!) is nearly exactly identical with the type from Ecuador. It is not so deeply cut, but the segments are similarly falcate and broadly crenate-repand, and the sporangia are intermixed with brown articulate paraphyses just as in the type.

18. *St. longicaudata* (Liebm.) C. Chr. l. c. 300, fig. 10.

Dryopteris longicaudata Maxon, Contr. U. S. Nat. Herb. 13: 18, 1909.

Area: Mexico along the Andes to Peru and Bolivia.

19. *St. alloëoptera* (Kze.) C. Chr. l. c. 300, fig. 11.

Area: Costa Rica—Peru.

Additional synonyms: *Polypodium oligophlebium* Bak. Syn. Fil. 506, 1874.
Dryopteris paucinervata C. Chr. Ind. 283, 1905.
Polypodium heterophlebium Bak. Journ. Bot. 1884: 363.
Dryopteris heterophlebia C. Chr. Ind. 270, 1905.
? *Polypodium coalescens* Bak. Journ. Bot. 1877: 164.
Dryopteris coalescens C. Chr. Ind. 258, 1905.

The specimens on which BAKER founded his two first named species are rather typical *S. alloëoptera*. *P. heterophlebium* from Costa Rica, leg. HARRISON (Kew!) has narrower pinnæ and approaches *S. longicaudata*, from which it differs by its shorter and broader pinnæ with many veins anastomosing. — *P. oligophlebium* from Peru, Tarapoto, Cerro de Guayrapurima, SPRUCE nr. 4653 (Kew!) is that form with few but very broad pinnæ, which I have figured. In general habit and cutting it is nearly identical with *S. opaca*. The long stipe is clothed with several large, brown scales.

P. coalescens Bak. was founded on a most wonderful mixture of different things collected by SODIRO in Ecuador (Kew!). The type-specimen (a single sheet) consists of three young sterile plants and one fertile pinna. The latter is no doubt a pinna of *S. alloëoptera*, and two of the young plants are probably belonging to the same species. The third plant is entirely different and does not belong to *Stigmatopteris*; what it may be, I dare not decide. I should not hesitate to make *P. coalescens* Bak. a synonym of *S. alloëoptera*, had SODIRO (Cr. vasc. quit. 302) not described the species more fully, and his description does not agree perfectly with the specimen seen; thus he describes the stipe and rachis as pulverulento-pubescent, both surfaces pubescent and lamina impari-pinnate with the terminal pinna stalked, broader and shorter than the 5—7 pairs of lateral ones. These characters do not correspond to any species of *Stigmatopteris*. On the other hand his description very well agrees with the fertile pinna seen in other characters: size and shape of the pinnæ, venation and position of the sori.

20. *Stigmatopteris opaca* (Bak.) C. Chr. comb. nov.

Syn. *Meniscium opacum* Baker, Journ. Bot. 1877: 166; Sod. Cr. vasc. quit. 390.

Dryopteris Christii C. Chr. Index 257, 1905.

Type from Ecuador, leg. SODIRO (authentic specimens in C!).

Closely allied to *St. alloëptera*, resembling it in size and its broad partly decurrent pinnæ, differing by its thick texture, meniscioid venation and confluent sori. By these characters it resembles very much species of *Meniscium*, to which genus or subgenus it was hitherto referred. A minute examination of a specimen will, however, clearly show great differences between it and species of *Meniscium*, and further that it is in nearly all characters a true *Stigmatopteris*. The lamina is distinctly pellucido-punctate, simple hairs are wanting but rachis and costæ beneath are sparsely clothed with small, reddish scales similar to those of other species of *Stigmatopteris*. The veins anastomose richly but not so regularly as in species of *Meniscium*, and the outer veinlets do not reach the margin but end in a clavate apex in the parenchyma; in *Meniscium* the outer veinlets always are united with the thickened margin. The sori are large and generally confluent as in *Meniscium*.

21. *St. caudata* (Raddi) C. Chr. l. c. 302 fig. 12.

Area: South Brazil.

22. *St. ichtiosma* (Sod.) C. Chr. l. c. 302 fig. 13.

Area: Ecuador-Colombia. Cuba, Jamaica.

Additional synonyms: *Polypodium dentatum* Bak. Ann. Bot. 5: 456, 1891.

Dryopteris longipetiolata C. Chr. Index 275, 1905.

BAKER'S proposed new species, founded on a part of a leaf gathered in Ecuador by SODIRO (Kew!), is absolutely identical with SODIRO'S species. SODIRO remarks (Cr. vasc. quit. 642) that BAKER'S species does not exist in his herbarium, and he believes that it may be his *Nephrodium crinitum* β *glaucescens*, l. c. 251. It must be granted that it is impossible from BAKER'S description to see, what his species may be; he compares it with *P. decussatum* and *P. rude* (!), which species *St. ichtiosma* is not at all related to. *N. crinitum* Sod. with its variety are forms of *D. submarginalis*.

23. *St. contracta* (Christ) C. Chr. l. c. 304, fig. 14.

Area: Costa Rica.

24. *St. pellucido-punctata* C. Chr. l. c. 304, fig. 15.

Type from Peru, Tarapoto, Mt. Guayrapurima, SPRUCE nr. 4720 (Kew!) A very large species, but bipinnatifid only. Stipe 1 cm. thick, rather scaly; pinnæ up to 45 cm. long, 7 cm. broad.

25. *Stigmatopteris prasina* (Bak.) C. Chr. comb. nov.

Syn. *Polypodium punctatum* Spruce, Hk. spec. fil. 4: 262, 1862.

Polypodium prasinum Bak. Syn. Fil. 312, 1867; ?Sod. Cr. vasc. quit. 292.

Dryopteris prasina C. Chr. Index 285, 1905.

Type from Peru, Tarapoto, Mt. Guayrapurima, leg. SPRUCE nr. 4719 (Kew!, also RB). I consider SPRUCE nr. 4719 the type-number of this species, to which the first name of the plant, *Pol. punctatum* Spruce, was given by SPRUCE; his nr. 5714 from Chimborazo (Kew, RB) belong to *St. ichtiosma*. *S. prasina* is fully bipinnate; the lower pinnulæ are free but broadly adnate to costa, lobed nearly half of the way down to the midrib into square or rectangular, entire or faintly serrated lobes; veins pinnate in the lobes, 3–4 to a side, simple. Sori about medial, without an indusium-like scale as in *S. ichtiosma*. — Plant very large, up to 2 m. high; stipe at base with many squarrose scales, which are up to 3 cm. long. Rachis, costæ and costulæ beneath richly fibrillose by reddish scales. Pinnæ 35 cm. or more long, lanceolate, short-stalked, 6 cm. broad at the middle; pinnulæ about 4 cm. long, 1 cm. broad. Lamina thin, grass-green, paler beneath, very distinctly pellucido-punctate.

A specimen from Ecuador, Andes of Quito, SODIRO (B) may be specifically different. It is *Pol. prasinum* Sod. Cr. vasc. quit. 292. It is much larger than the Peruvian type and less scaly. The pinnæ are distinctly stalked, the pinnules sessile, 10 cm. long by 2 cm. broad, incised $\frac{3}{4}$ of the way down to the midrib into obtuse, serrulate segments. Veins in about 5 pairs to a segment, as a rule forked near the middle, the anterior branch very short and soriferous. In texture, colour and immersed glands the specimen agrees with *S. prasina*.

Group 2. *Peltochlaena*. (Species 26–28)¹⁾.

26. *Dryopteris varians* (Fée) O. Ktze. Rev. 2: 814, 1891; C. Chr. Ind. 299.

Fig. 2 c.

Syn. *Nephrodium varians* Fée, 11 mém. 88 tab. 24 fig. 2, 1866.

Type from Trinidad, leg. GERMAIN (Herb. Mus. Paris!). — Bot. Gard. Herb. Trin. nr. 1225 (W); Aripo-Savannah „im schattigen Walde an Bäume kletternd“, OTHMER nr. 116 (Herb. Monac., C, CC). British Guiana, Essequibo, APPUN nr. 27 (B, RB).

This is a most distinct species. Leaves somewhat dimorphous, the sterile ones being considerably broader than the fertile ones, about 10 cm. long by 2 cm. wide, short-stalked, truncate at the upper base but scarcely auricled, cuneate at the lower one, the margins subentire or repand or broadly serrulate, always sharply serrate towards the apex. Fertile leaves with pinnæ scarcely more than 1 cm. broad, very variable in cutting, being from almost entire (the serrated apex ex-

¹⁾ The species of this group I have not named *Stigmatopteris* but use the names of Index Filicum.

cepted) to deeply and irregularly pinnatifid. The variations are often to be found in the same leaf. — Lamina with a subdistinct terminal pinna, herbaceous-membranous, perfectly glabrous and naked, dark-green. Veins 3—4 to a side, anastomosing about as in certain species of *Goniopteris*. Sori small, furnished with a deciduous, membranous, glabrous, reddish, wrinkled, peltate indusium. — The Guiana-specimens differ from the type from Trinidad by more numerous pinnae, which have a longer petiole and are more equally cuneate at the base on both sides.

D. varians is in some characters, f. inst. the wide-creeping rhizome and perhaps in the lack of immersed glands, rather different from the general type of *Stigmatopteris*. In the Trinidad-specimens I have not found immersed glands, while they are seen indistinctly in the specimens from Essequibo. As to other characters it does not differ materially from *Stigmatopteris*, and I think it best to place the species here. From all other groups of *Dryopteris* it is widely different.

27. *Dryopteris sancti-gabrielii* (Hook) O. Ktze. Rev. 2: 813, 1891;
C. Chr. Index 290. — Fig. 2 a.

Syn. *Polypodium Sancti-Gabrielii* Hook. spec. fil. 4: 233, 1862.

Nephrodium Sancti-Gabrielii Bak. Flor. bras. 1²: 469, 1870.

Aspidium Imrayanum Fée, Cr. vasc. Brés. 1: 133, 1869.

Type from Amazonas, São Gabriel, SPRUCE nr. 2153 (Kew!).

Venezuela, Merida, ENGEL nr. 231 (B).

Trinidad, FENDLER nr. 97 (W).

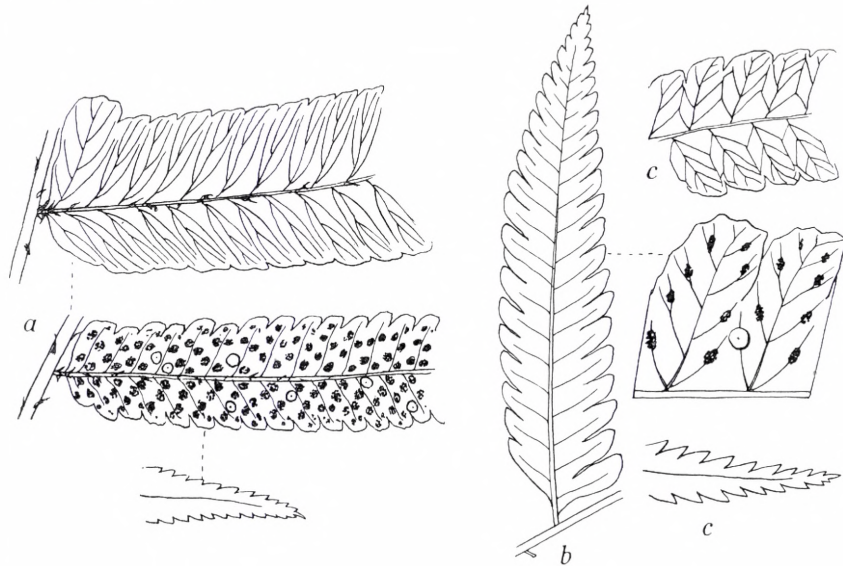


Fig. 2. a. *D. sancti-gabrielii* (Hook.) O. Ktze. Basal part of sterile and fertile pinna and apex of a pinna, $\times \frac{4}{5}$. — b. Pinna of *D. subobliquata* (Hook.) O. Ktze., $\times \frac{4}{5}$, and two segments $\times 1\frac{1}{2}$. — c. Middle part and apex of a pinna of *D. varians* (Fée) O. Ktze., showing venation, about nat. size.

This is a large species with subdimorphous leaves, the sterile ones being much larger than the fertile. Sterile lamina up to 50 cm. long, 40 cm. broad, truncate at base, upwards gradually narrowed to the pinnatifid apex. Pinnæ 15—20-jugate, short-stalked, 15—20 cm. long, 3 cm. broad, the lower base bluntly rounded, the upper one truncate and with a broad, obtuse auricle; margins broadly and shallowly serrulate, towards the submucronate apex more distinctly serrate. Texture membranous to firmly papyraceous, colour fresh-green, paler beneath. Stipe, rachis and costæ beneath sparsely clothed with reddish or blackish small scales. Veins in groups of 3—4, upcurved, not reaching the margin, free. — Fertile lamina similar, but the pinnæ only 10—12 cm. long by $1\frac{1}{2}$ — $1\frac{3}{4}$ cm. broad. Sori in the lower half of the vein, in most specimens apparently exindusiate, but in a single of FENDLER'S Trinidad-specimens the sori are covered by large, circular, peltate, glabrous, coriaceous indusia; a single indusium is found in the type-specimen.

D. sancti-gabrieli can with certainty be referred to *Stigmatopteris*, differing from the general type by its peltate indusia.

28. *Dryopteris subobliquata* (Hook.) O. Ktze. Rev. 2: 813, 1891;
C. Chr. Index 296. — Fig. 2 b.

Syn. *Polypodium subobliquatum* Hk. spec. 4: 240, 1862.

Nephrodium subobliquatum Bak. Syn. 261, 1867.

Type from Surinam, HOSTMANN nr. 15 (Kew!).

Closely related to the preceding species, but easily recognizable by several characters. Leaf generally coriaceous, entirely glabrous, lamina lanceolate, about 40 cm. long with 10—15 pairs of rather remote, subopposite, short-stalked pinnæ, which are all alike, 12 cm. long by $2\frac{1}{4}$ —3 cm. broad, the lower base shortly cuneate, the upper one truncate, scarcely auricled, the margins lobed about half-way down to the midrib into oblong, obtuse, entire segments; apex of pinnæ mucronate. Veins simple, free, 3—4 to a side, short, not reaching the margin. Sori small, furnished with an early falling, large, coriaceous, glabrous, peltate indusium.

I call here this distinct species *D. subobliquata*, although I have no doubt that it is identical with *Aspidium guianense* Kl., Linnaea 20: 364, 1847; *Peltochlaena nephrodiiformis* Fée, Gen. 289 is probably the same. I have, however, not seen the original specimen of *A. guianense*, which commonly is referred as a subspecies to *Polystichum abbreviatum* (Schrad.), and I shall not here create a new combination of name, mainly because the position of the species in *Dryopteris* is very questionable. It is possible that it may be a free-veined form of *Polystichum abbreviatum*, still I think it can be regarded as a distinct species forming a connecting link between *D. sancti-gabrieli* and *Polyst. abbreviatum*. Its systematic position will naturally be in *Stigmatopteris*. Some of the specimens seen have distinct immersed glands.

Specimens seen:

French Guiana, LEPRIEUR nr. 42 (C, W); RICH (CC); — Demerara, JENMAN (B, C, W).
 Colombia, Cauca, LEHMANN nr. 3802 (B).
 Brazil, Pará, Approya, J. HUBER nr. 753 (C). — Rio, GLAZIOU nr. 12373 (B, H).

Polystichum abbreviatum (Schrad.) Pr. (for synonymy see Index Fil. 575, the subspecies excluded) should probably also be placed in this group. It is very closely related to *D. subobliquata*, mainly different by the anastomosing veins. It is known from Brazil and also recorded from Guiana and Ecuador. Besides several specimens from Brazil I have seen one from Colombia, Córdoba, Dagua Valley, 30—100 m., H. PITTIER nr. 529 (W).

 Subgenus 3. *Ctenitis* C. Chr.

Biolog. Arbejder tilegnede Eug. Warming, p. 77. 1911.

A natural subgenus including several species all having an erect or oblique rhizome, which like the bases of stipes is clothed at the apex with a dense mass of scales; these are as a rule very large, toothed at the margin or, more rarely, subentire, their apex very long and hairlike; in some species, f. inst. *D. strigilosa* Dav., the scales are long and narrow, dark-brown and rigid. — Lamina bipinnate-decompound, as a rule brownish green when dry, membranous or herbaceous, rarely coriaceous, not or a little narrowed downwards, more often deltoid and then the basiscop pinnulæ of the basal pinnæ are more or less enlarged. Rachis and costæ beneath always furnished with many or few scales, which are differently shaped in the different species (see fig. 3). Rarely they are quite entire, generally the margins are toothed, or, as in *D. deflexa*, long ciliated; always the apex is long and hairlike, and some few long ciliæ are to be found at the cordate base; in some species the base of the scale is bullate or subbullate. The cells are as a rule large and regular, most often rectangular, the inner cell-walls often very thickened and dark, while the outer ones are always thin and colourless (clathrate scales). The structure and shape of the scales, especially of those of the costæ beneath are important specific characters. — Besides the scales the species are furnished with short, articulate, reddish hairs, which in all species are to be found on the costæ above; they consist of 2—4 short, cylindrical cells separated by dark, thick walls (see fig. 3,1). If hairs occur elsewhere, on leaf tissue, veins or margins, they are generally of the same structure. Short, unicellular hairs I have met with only in two species, *D. platyloba* and *D. leptosora*. Some species are glanduloso-pubescent by hairs of a similar structure, but often shorter end ending at a gland. Sessile glands as in species of *Lastrea* scarcely occur. Aërophore none. — Veins simple or, in some species, forked, never anastomosing, the basal ones reaching the margin above sinus, or, in the less-divided species as *D. pedicellata*, running

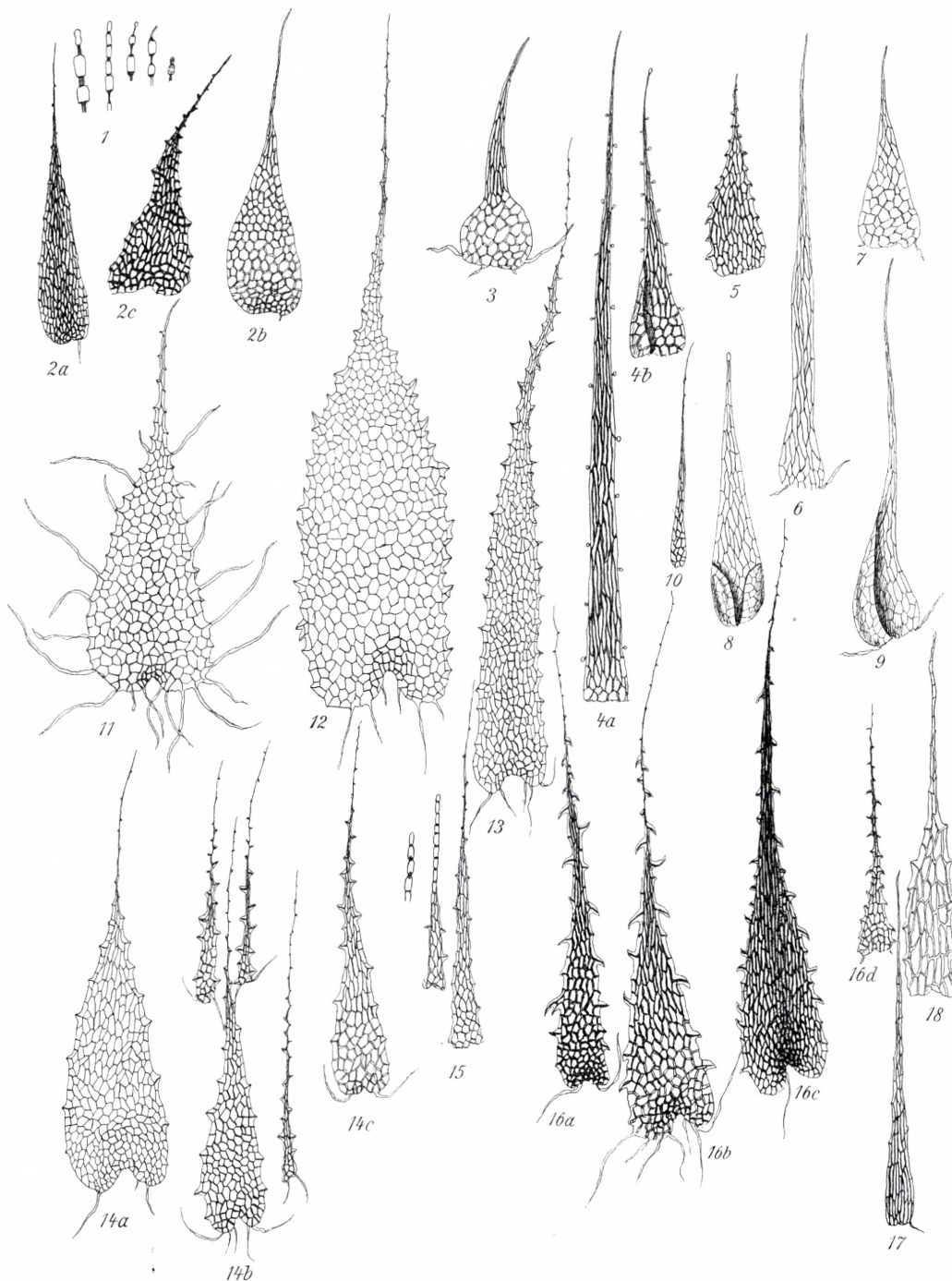


Fig. 3. Hairs and scales of different species of § *Ctenitis*. The scales are all, 4a only excepted, from the costae of the pinnae beneath. -- 1. Hairs of the common type. 2. *D. falciculata*: a. type; b. *Pol. ciliatum* Pr.; c. var. *paranaensis*. 3. *D. nigrovenia*. 4. *D. strigilosa*, a. from stipe. 5. *D. pedicellata*. 6. *D. refulgens*. 7. *D. refulgens* var. *peruviana*. 8. *D. vellea*. 9. *D. cirrhosa* var. *eriocaulis*. 10. *D. also-philacea*. 11. *D. deflexa*. 12. *D. fenestralis*. 13. *D. Anniesii*. 14. *D. submarginalis*: a. type (*D. Sellowii*), b. 4 scales of var. *tenuifolia*, c. var. *caripensis*. 15. *D. Karstenii*, 3 forms. 16. *D. ctenitis*: a. type. b—c. f. *amaurolepis*, b. lateral scale and c. frontal scale from the same costa, d. f. *isabellina*. 17. *D. honesta*. 18. *D. yungensis*.

towards the sinus but not meeting there and thus not being truly connivent; costulæ run out from the costæ under open angles. Sori indusiate or not, the indusium rarely large and persistent. Sporangia glabrous.

Ctenitis is a very natural group, by the peculiar pubescence different from all other groups of the genus, and I have no doubt that the differences are of generic value. The species vary being from bipinnate to decomposed, most of them with characteristic obtuse segments, rather small to large. All intermediates between bipinnate and large decomposed species are found, such are f. inst. *D. strigilosa* and *D. Hemsleyana*. In America the bipinnate species are numerous in Southern Brazil, while only one, *D. vellea*, occurs in the West Indies, where several decomposed species (*D. hirta*, *D. ampla*, *D. nemorosa* etc.) are to be found. In the Old World's tropics the subgenus is fairly well represented. Among them is the African *D. cirrhosa* (Schum.) O. Ktze., which I cannot distinguish specifically from the Brazilian *D. eriocaulis* (Fée) O. Ktze., a new example of the well-known relation between the floras of South Brazil and tropical West Africa.

Ctenitis is not nearly related to the other subgenera of *Dryopteris* and in my opinion it is even not congeneric with them. On the other hand it is intimately related to the genus *Psomiocarpa* Presl., recently restored by CHRIST¹⁾, who referred to that genus two West Indian species, *Ps. aspidioides* (Griseb.) and *Ps. Maxoni* Christ. I know the first named of these species, which in habit, texture, colour and pubescence is perfectly agreeing with *Ctenitis*; by its contracted fertile frond it differs, however, so much that it naturally must be placed in a separate genus, which can be regarded as a derivate of *Ctenitis*. *Psomiocarpa* was previously united with *Polybotrya*, which genus is more closely related to *Polystichum*.

Ctenitis is further related to the genus *Aspidium* (*Tectaria*) at least to the majority of the species referred to that genus. The main difference is found in the venation, *Ctenitis* having free veins, *Aspidium* reticulated veins; in pubescence, texture and colour most species of the two genera fully agree. Species intermediate between the two genera exist, f. inst. *Dryopteris Brauniana* (Karst.) O. Ktze. from Colombia (KARSTEN; LINDIG nr. 261 (B); LEHMANN (RB)). It has free veins but is in habit rather a species of *Aspidium*, to which genus I refer it, wherefore it is not included in this paper.

In the following I deal with 24 species. It is, in this subgenus, impossible to draw a sharp line between the bipinnatifid and the more divided species. Some of the species vary considerably in cutting being bipinnatifid, bipinnate or tri-pinnatifid. I have chosen to include in this monograph those species only of which I have had type-specimens and which in the most developed form are scarcely more than bipinnate.

The 24 species can be divided into smaller groups, which are connected by intermediate characters:

¹⁾ On *Psomiocarpa*, a neglected genus of ferns. Smithsonian Misc. Collections 56 nr. 23. 1911.

1) The group of *D. submarginalis* including the species 29—40, closely allied species with differently shaped but never bullate scales; stipe at base as a rule with a dense mass of large scales. Veins reaching the margin.

2) The groups of *D. Lindeni*, including the species 44—46, smaller Central-American species with very characteristic bullate scales; base of stipe scaly but not with a dense tuft of large scales; veins often furcate, not reaching the margin. The species 41—42, *D. nigrovenia* and *D. Tonduzii* are intermediate between the first and the second group.

3) The group of *D. platyloba*; hereto the species 48—52, characterized by broad, obtuse segments with normally furcate veins, which do not reach the margin. The lamina is often finely pellucido-punctate; by this character as well as by venation the species of this group resemble *Stigmatopteris*, from which they differ by the non-serrated apex of the pinnæ and by the presence of articulated hairs. In some of the species the articulated hairs are subulate, and very short, unicellular hairs are also found. To this group mainly decomposed species belong; *D. refulgens* is an intermediate between the first and the third group.

Key.

1. Veins normally simple, still often forked in the basiscop enlarged segments of the lower pinnæ.
2. Segments normally entire or faintly crenate or serrate; the basal pair of pinnæ scarcely enlarged.
3. Pinnæ incised $\frac{1}{3}$ — $\frac{2}{3}$ of the way to the costa; the lower 2—5 veins run to the sinus.
 4. Pinnæ incised $\frac{1}{3}$ — $\frac{1}{2}$ into broad, obtuse segments; the lower 4—5 veins (2 pairs) run to the sinus.
 5. Pinnæ 10—15 cm long by $2\frac{1}{2}$ —3 cm broad, abruptly and shortly acuminate; scales few, dark, toothed. Brazilian species
 29. *D. pedicellata* (Christ) C. Chr.
 5. Pinnæ 20 cm long by 4 cm broad, long acuminate; scales numerous, entire, reddish. Andes and Guiana. . . 30. *D. refulgens* (Kl.) C. Chr.
 4. Pinnæ incised $\frac{1}{2}$ — $\frac{2}{3}$; 2 basal veins run to the sinus. Scales very few and small, dark. Lamina generally with a distinct terminal pinna.
 31. *D. alsophilacea* (Kze.) O. Ktze.
 3. Pinnæ incised to a narrow wing to the costa or larger ones of some species fully pinnate in their basal part.
 4. Scales of rachis dark and rigid, not thin, hairlike and not broad and reddish. Indusium persistent.

5. Scales of costæ entire or slightly toothed. Lamina often glanduloso-pubescent. Veins 5—10-jugate.
 6. Scales ovate, not bullate; sori supramedial. Brazil and Guiana.
 32. *D. falciculata* (Raddi) O. Ktze.
 6. Scales of costæ from a broad, generally bullate base abruptly narrowed into a short, narrow apex. Central American and Andine species.
 7. Both surfaces with scattered short, thick hairs, not glanduloso-pubescent. Larger species, generally dark-green.
 41. *D. nigrovenia* (Christ) C. Chr.
 7. Both surfaces (costa excepted) glabrous or glanduloso-pubescent.
 8. Veins reaching the margin. Lamina thin, light-green.
 9. Lamina glabrous; scales of stipe and rachis rather thin, from a broad base narrowed into a hair-like apex.
 42. *D. Tonduzii* (Christ) C. Chr.
 9. Lamina densely glanduloso-pubescent throughout; scales of stipe and rachis very narrow, black-brown.
 43. *D. strigilosa* Dav.
 8. Veins not reaching the margin. Scales bullate. Lamina firm, dark-green.
 9. Pinnæ pinnatifid only; segments shallowly serrate.
 44. *D. Lindenii* (Kuhn) O. Ktze.
 9. Pinnæ pinnate in the lower part; segments or pinnules entire, ligulate or deeply lobed with 2—3 obtuse, oblique lobes 46. *D. lanceolata* (Bak.) O. Ktze.
5. Scales of costæ lanceolate with claw-shaped teeth. Veins 10—15-jugate. Lamina not glanduloso-pubescent, dark-green.
 6. Sori medial or supramedial. Veins 10—11-jugate.
 32. *D. falciculata* var. *paranaensis* C. Chr.
 6. Sori inframedial. Veins 12—15-jugate 33. *D. ctenitis* (Link) O. Ktze.
4. Scales of rachis reddish or yellowish, thin, hairlike or broad. Lamina mostly light-green.
 5. Scales of rachis not many, hairlike. Sori medial or supramedial.
 6. Costæ beneath without articulated hairs. Veins 10—15-jugate. Indusium often absent. . . . 34. *D. submarginalis* (L. & F.) C. Chr.
 6. Costæ beneath with articulated hairs among the scales. Veins 8-jugate. Indusium distinct. . . . 35. *D. Karstenii* (A. Br.) C. Chr.
 5. Rachis densely scaly by broad, reddish or dirty-brown scales. Sori medial or inframedial; indusium in most species persistent.
 6. Scales toothed or fringed by long cilies, their base flat.
 7. Scales with long cilies along the margins. Veins 6—8-jugate.
 36. *D. deflexa* (Klf.) C. Chr.

7. Scales toothed, without long cilies. Veins 12—18-jugate.
 8. Scales of rachis adpressed. Sori near the midvein; indusium persistent 37. *D. Anniesii* Ros.
 8. Scales of rachis broad, loose. Sori medial without distinct indusium 38. *D. fenestralis* n. sp.
6. Scales entire with a pocket-shaped base.
 7. Veins 8—10-jugate. Upperside glabrous. West-Indian species. 39. *D. vellea* (Willd.) O. Ktze.
 7. Veins 10—12-jugate. Both surfaces hairy. Brazil. 40. *D. cirrhosa* var. *eriocaulis* (Fée)
2. Segments normally distinctly serrated or lobed, at least those of the basal pinnæ. Central American and Andine species.
3. Basal pinnæ not considerably enlarged. Indusium distinct.
 4. Veins reaching the margin.
 5. Surfaces with scattered, short, thick hairs, not glanduloso-pubescent. Larger species, generally dark-green 41. *D. nigrovenia* (Christ) C. Chr.
 5. Both surfaces (costæ excepted) glabrous or glanduloso-pubescent. Lamina thin, light-green.
 6. Surfaces not glanduloso-pubescent, scales of stipe and rachis rather thin, from a broad base narrowed into a hair-like apex, those of rachis bullate 42. *D. Tonduzii* (Christ) C. Chr.
 6. Surfaces throughout glanduloso-pubescent. Scales of stipe and rachis very narrow, black-brown 43. *D. strigilosa* Dav.
 4. Veins not reaching the margin. Scales of costæ bullate. Surfaces glabrous. Lamina firm, dark-green.
 5. Pinnæ pinnatifid only; segments serrated.
 6. Veins 2—3-jugate. Stipe and rachis slender. 44. *D. Lindeni* (Kuhn) O. Ktze.
 6. Veins 5-jugate. Stipe strong 45. *D. Salvini* (Bak.) O. Ktze.
 5. Pinnæ pinnate in the lower half; segments or pinnules ligulate, entire or deeply lobed with 2—3 obtuse lobes. 46. *D. lanceolata* (Bak.) C. Chr.
3. Basal pinnæ the largest, bipinnatifid; upper ones smaller, pinnatifid with entire segments.
 4. Small. Veins not reaching the margin. Sori very large, persistent. 46. *D. lanceolata* (Bak.) O. Ktze. var.
 4. Larger. Veins reaching the margin. Exindusiate. 47. *D. Hemsleyana* (Bak.) C. Chr.
1. Veins normally furcate.
2. Hairs of the common type, short, rarely unicellular. Veins generally not reaching the margin.
3. Segments narrow, uniformly serrate. Scales bullate. Indusium large.

4. Veins 2-3-jugate. Stipe and rachis slender. 44. *D. Lindeni* (Kuhn) O. Ktze.
4. Veins 5-jugate. Stipe strong 45. *D. Salvini* (Bak.) O. Ktze.
3. Segments broad, obtuse, entire or obtusely lobed. Scales not bullate. Exindusiate.
 4. Costæ beneath without short, unicellular hairs.
 5. Andine species.
 6. Pinnæ scarcely incised to costa, the segments entire (the lower basal one excepted).
 7. Sori placed at the base of the anterior branch of the forked vein. Scales narrow, dark 48. *D. honesta* (Kze.) C. Chr.
 7. Sori above the middle of the anterior branch of the forked vein. Scales broader, yellowish. 49. *D. yungensis* Christ et Ros.
 6. Lower pinnæ pinnate with lobed pinnulæ.
 52. *D. biserialis* (Bak.) C. Chr.
 5. Brazilian species *D. grandis* * *macroptera* (Klf.) C. Chr.
 4. Costæ beneath hairy by short, unicellular hairs.
 5. Lamina fresh-green. Basal segments reduced . 50. *D. leptosora* C. Chr.
 5. Lamina brownish-green. Basal segments not reduced, the lower one of the upper pinnæ decurrent and adnate to rachis.
 51. *D. platyloba* (Bak.) C. Chr.
2. Lamina very hairy by long, flexuose, soft, pluricellular hairs.
 53. *D. hirsuto-setosa* Hieron.

29. *Dryopteris pedicellata* (Christ) C. Chr. comb. nov. — Fig. 4.

Syn. *Aspidium pedicellatum* Christ, Denkschr. Akad. Wien 79: 14. (1906). 1907.
Dryopteris indecora Rosenst. Hedwigia 46: 117. 1906 (non C. Chr. Ind.
 272. 1905).

Type from Brazil: São Paulo, prope Santos, leg. WETTSTEIN & SCHIFFNER.
 (Original in Herb. Mus. Wien! and C!).

A Brazilian representative of the Andine *D. refulgens* and together with that species different from all other species of the subgenus by the pinnæ being incised scarcely more than halfway to the costa. From *D. refulgens* it differs 1) by the dark-green leaf, which is 20—25 cm broad; pinnæ 2½—3 cm broad, 2) pinnæ from a truncate base oblong-linear with parallel edges suddenly narrowed into a short, acute apex; segments close, 4 mm broad, truncate and often emarginate at the apex; veins 7—9, the lower 2—4 running to the sinus, all reaching the margin, or often the lower-most pair do not reach the sinus but end in the leaf-tissue below the sinus, 3) rachis and costæ beneath sparingly scaly; scales small, dark reddish-brown, mostly ovate with a short apex and shortly toothed margins; cell-walls

dark and thick, the lumina small; those of the costæ beneath adpressed, not patent (fig. 3,5); 4) stipe at the base with some dark-brown, rather long scales. — Sori small, medial, exindusiate. — From *D. alsophilacea*, to which it is closely related, it differs by its more numerous and close pinnæ, its larger scales and by the short, pinnatifid apex of the lamina.

D. pedicellata is confined to Southern Brazil, where it seems to be a rather common species, I have seen the following additional specimens (for others see ROSENSTOCK Hedwigia 46: 117).

São Paulo: Santos, MOSÉN nr. 3089 (Rg).

Sta. Catharina, Itapocú, SCHWACKE nr. 12935 (C). — São Francisco, ULE nr. 75 (RB).

Paraná, Serro do Mar, Ypiranga, DUSÉN nr. 6753 (S).

30. *Dryopteris refulgens* (Kl.) C. Chr. Ind. 288. 1905. — Fig. 5 a.

Syn. *Polypodium refulgens* Kl. msc.; Hk. Bak. Syn. 307.

Phegopteris refulgens Mett. Ann. sc. nat. V. 2: 240. 1864.

Phegopteris tricholepis Fée, Cr. vasc. Brés. 1: 98 tab. 32, fig. 1. 1869.

Type from Guiana, SCHOMBURGK nr. 1128 et 1183 (B!)

A very distinct species, in cutting very near *D. pedicellata*, in size, colour and scales near *D. eriocaulis*. Stipe below with a dense mass of long, reddish scales. Lamina yellowish-green, firmly herbaceous or membranous, 50–60 cm long; pinnæ about 20 cm long by 4 cm broad, acuminate, incised about halfway to the costa into 7 mm broad, bluntly rounded or subacute, faintly toothed or entire segments. Rachis and costæ beneath scaly by red, narrow, entire scales with thin cell-walls, much like those of *D. eriocaulis* but their base flat; scales of costæ patent, mostly at right angles to the costa (fig. 3,6). Margins and veins beneath finely pubescent, the underside sometimes glandular by red, sessile glands. Veins 9–11-jugate, the lower 3–5 running to the sinus, the lowermost much ascending, the upper ones not reaching the margin. Sori medial or slightly inframedial, exindusiate.

Judging from the structure of the scales this very beautiful species is more related to *D. eriocaulis* than to *D. pedicellata*, and stands to that species as *D. pedicellata* to *D. ctenitis*.

Guiana: SCHOMBURGK nr. 1128 and 1183 (B). — Demerara, JENMAN (B).

Colombia: Magdalena, LINDIG nr. 382 (B).

Panamá: SCHOTT nr. 7 (B, W).

Brasília: Rio Negro, São Gabriel, SPRUCE nr. 2100 (B = *Ph. tricholepis* Fée).

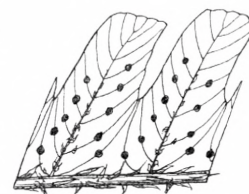
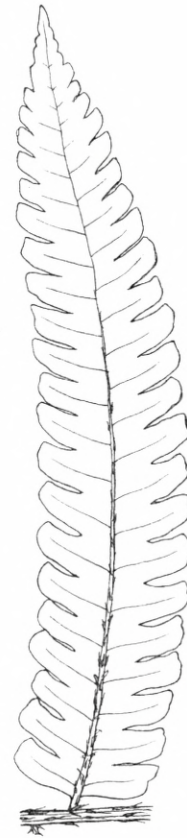


Fig. 4. *D. pedicellata* (Christ) C. Chr. Pinna $\times \frac{4}{5}$; segments $\times 1\frac{1}{2}$. (Orig.)

var. *peruviana* n. var. — Fig. 5 b.

Syn: *Dryopteris refulgens* Hieron. Hedwigia. 46: 324. 1907.

Pinnæ incised scarcely more than one third with about 3 pairs of veins running to the sinus; lower veins irregularly flexuose and sometimes united. Scales few and small, ovate with a short apex. Otherwise typical.

Peru: Tarapoto, SPRUCE nr. 4657 (L, B), 4712 (W) — STÜBEL nr. 1097 (B).

31. *Dryopteris alsophilacea* (Kze.) O. Ktze. Rev. 2: 812. 1891. — Fig. 5 c.

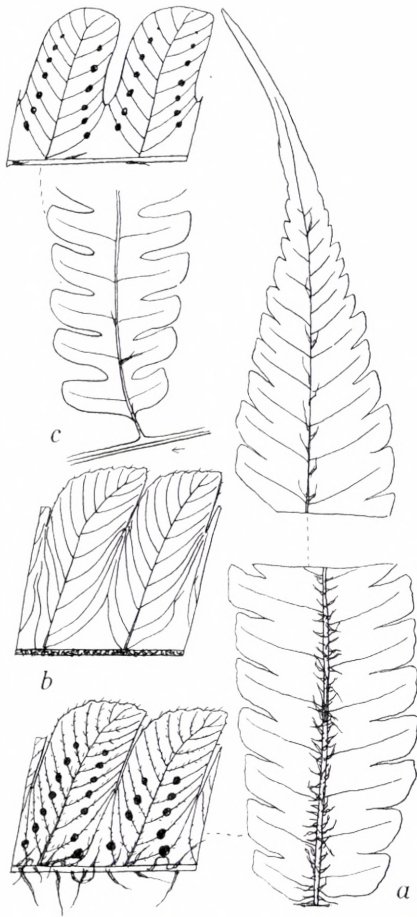


Fig. 5. a. Base and apex of *D. refulgens* (Kl.) C. Chr. $\times \frac{4}{5}$, and two segments $\times 1\frac{1}{2}$ (orig.). b. Segments $\times 1\frac{1}{2}$ of *D. refulgens* var. *peruviana*. c. Base of pinna of *D. alsophilacea* (Kze.) O. Ktze. $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$. (orig.)

Syn. *Aspidium alsophilaceum* Kze.; Mett. Aspid. nr. 218. 1858.

Nephrodium alsophilaceum Bak. Fl. bras. 1²: 474. 1870; Syn. Fil. 495.

Polypodium aspidioides Pr. Del. Prag. 1: 170. 1822.

Lastrea aspidioides Pr. Epim. 41. 1849!

Dryopteris tenuifolia C. Chr. Ind. 297. 1905, non Ktze.

Aspidium tijucense Fée, Cr. vasc. Br. 2: 72. tab. 102. 1872—73.

Dryopteris itatiaiensis C. Chr. Ind. 272. 1905.

Type from Rio leg. POHL (herb. PRESL!).

FÉE's plate cited above is a good figure of this species, which is intermediate between *D. pedicellata* and *D. falciculata* var. *paranaensis*; it is marked by its remote and long-stalked pinnæ, its distinct terminal pinna and its few and small scales. Pinnæ in 6—7 pairs, at distances of 5—6 cm, shortly acuminate, incised $\frac{2}{3}$ of the way to the costa into falcate, entire, obtuse segments; scales of the costæ beneath very few and small, narrow-linear, scarcely toothed, dark-coloured, (fig. 3,10). Surfaces glabrous; colour dark-green; texture membranous. Veins 8—10-jugate, the lower 2 running to the sinus. Sori medial with a subpersistent, reddish, glabrous indusium. Rhizome oblique with numerous red-brown scales at the top, but not with a dense mass of long scales.

A very constant species, which I had identified (following METTENIUS) with *Lastrea tenuifolia*

Presl and in Ind. Fil. therefore renamed *Dr. tenuifolia*. *L. tenuifolia* Pr. is however a form of *D. submarginalis*, and therefore I must fall back to the specific name *alsophilacea*. The species is confined to the mountains of South-eastern Brazil, and I name here some collector-numbers.

Rio: SCHOTTMÜLLER nr. 35 (B), MOSÉN nr. 99 (Rg, S), DUSÉN nr. 1611 (C, W), GLAZIOU nr. 5262 (B, H),
Rg = *A. tijucense* Fée).

S. Paulo: WACKET nr. 185 (R), RIO TIETÉ, Gerder nr. 87 (R), HANS nr. 127 (R).

Santa Catharina: Joinville, E. ULE nr. 42 (RB).

32. *Dryopteris falciculata* (Raddi) O. Ktze. Rev. 3²: 378. 1898; C. Chr. Ind. 264.

Syn. *Aspidium falciculatum* Raddi, Opusc. sci. Bol. 3: 289. 1819; Pl. Bras. 1: 31 tab. 47, 1825.

Polypodium ciliatum Presl, Del. Prag. 1: 169. 1822!

Aspidium chrysolobum Klf.; Link, Hort. Berol. 2: 117. 1833.

Dryopteris chrysoloba O. Ktze.; C. Chr. Ind. 257 (which see).

Polypodium distans Klf. Enum. 113. 1824!

Aspidium Schomburgkii Kl. Linnaea 20: 369. 1847!

Aspidium Schottianum Kze.! (Bak. Syn. 262. 1867).

Aspidium mucronatum Beyrich msc.!

Aspidium sericeum Fée, Cr. vasc. Brés. 1: 144 tab. 42, fig. 1. 1869!

Type from Rio, not seen, but numerous specimens from Rio agree perfectly with Raddi's figure, and I consider them typical. They can be described as follows:

Rhizome obliquely erect. Stipes fasciculated, up to 3—4 dm long, slender, brownish stramineous, very shortly hairy and like the apex of the rhizome clothed with black-brown, rather thick and rigid, entire and long acuminate scales, which are 1 mm broad and 4—5 mm long; in the upper part of the stipe the scales become fewer and deciduous. Rachis like the stem, somewhat angular and bisulcate above. Lamina deltoid-lanceolate with the lowest pair of pinnae not or a little reflexed, towards the apex rather suddenly narrowed but without a distinct, terminal pinna, herbaceous, generally dark-green, 30—60 cm long, 20 cm broad. Larger pinnae shortly petiolulate, lanceolate, 10—13 cm long, 2—2½ cm broad, subopposite, ciliate, truncate at the base, acuminate, the basal pair often with the lower side enlarged. Costæ above densely tomentose by crisped, pluricellular, reddish hairs, which in some forms also occur on the veins and leaf-tissue; costæ beneath with some few small, entire or rarely slightly dentate, reddish-brown scales, which are ovate with a long hair-like apex and formed by almost isodiametric cells with rather thick walls (fig. 3²), surfaces glabrous or more or less glanduloso-pubescent. Basal segments sometimes quite free and very often much reduced. Larger segments a little falcate, as a rule faintly dentate, obtusely rounded at the apex or in some forms submucronate, 3—4 mm broad, connected by a very

narrow wing. Veins simple, 6—8 to a side, the basal ones much upcurved and reach the margin above sinus, the upper ones very oblique and run out in the teeth, about all soriferous. Sori middle-sized, yellowish brown, a little above the middle of the vein. Indusium rather large, yellowish, glanduloso-ciliate, persistent.

The form here described is very common in the mountains round Rio; the original specimens of *Pol. ciliatum* Pr. (hb. Presl!), *Aspid. chrysolobum* Klf. (B!) and *A. mucronatum* Beyrich (B!) differ not at all. I have seen numerous specimens, f. inst. GLAZIOU nr. 7949, MOSÉN nr. 98, 2696, 2697 etc., and they vary only a little, mainly in pubescence. Two extreme forms can be separated:

f. *glabrata* Hieron. msc.

Surfaces (costæ excepted) quite glabrous.

— GLAZIOU nr. 12288 (B, H) and others. — This form is probably *Nephrodium chrysolobum* Bak. Fl. Bras. and Syn. Fil.

f. *sericea* Fée = *Aspid. sericeum* Fée, *A. Schottianum* Kze.

Both surfaces throughout densely and shortly glanduloso-pubescent.

— GLAZIOU nr. 957, 1658 (H).

Between these two extremes one finds numerous intermediate forms, and I consider them all belonging to the typical form of the species. This seems to be rare in other parts of Brazil. I have seen the following specimens only:

Minas Geraes: Lagoa Santa, WARMING (H) — CLAUSSEN (B).

São Paulo: Santos, USTERI (C) — IGUAPE, WETTSTEIN u. SCHIFFNER (C) — ?ULBRICHT nr. 57b (R).

Parahyba: GÖLDI (C) = f. *glabrata*.

Rio Negro: Ega, MARTIUS (B) — Segments dentate, approaches *D. nigrovenia*.

British Guiana: SCHOMBURGK nr. 1167 (B = *A. Schomburgkii* Kl.; rather typical).

A specimen in B gathered and determined (?) by RADDI as *Polypodium falciculatum* Raddi, Opusc. sci. Bol. 3: 288. 1819; Pl. Bras. 1: 24 tab. 36 bis, belongs to the typical form of *D. falciculata*, but it does not agree perfectly with RADDI's description. What *P. falciculatum* Raddi may be is questionable; probably it is a form of the present species.

In the southern states of Brazil are to be found a series of forms, which do not differ essentially from typical *D. falciculata*, while they in some characters are so different, that it is possible that they belong to a distinct species, intermediate between *D. falciculata* and *D. ctenitis*. I refer them to *D. falciculata* as

var. *paranaensis* n. var.

Syn. *D. falciculata* Rosenstock, Hedwigia 46: 116. 1906, where Dr. ROSENSTOCK has given an excellent description of this variety.

Type specimen: Paraná: Villa Nova, leg. ANNIES, Rosenstock, Fil. austr. bras. exsic. nr. 79 (R, W).

It differs from *D. falciculata* type by the following characters: 1) Stipe at base with numerous, long scales, almost as in *D. submarginalis*, 2) lamina larger

and broader: pinnæ up to 15 cm long by 3¹/₂—4 cm broad; segments 5 mm broad, costæ above and margins excepted quite glabrous, 3) stipe, rachis and costæ beneath rather densely scaly, the scales rigid, nearly black, more or less dentate with a long fibrillose apex, the cell-walls thick and dark (fig. 3^{2c}), 4) veins 10—11, more distinct than in the type.

From *D. ctenitis* it differs by fewer veins and medial or supramedial sori and by the shorter teeth of the scales.

Besides the specimens enumerated by ROSENSTOCK (l. c.) I have seen:

Santa Catharina: Itajahy, E. ULE nr. 190 (RB).

Paraná: Maréchal Mallett, P. DUSÉN nr. 3068 (C).

Minas Geraes: Serra do S. José d'El Rey, A. SILVEIRA nr. 358 (C).

Most specimens referred hereto with doubt by ROSENSTOCK belong to *D. submarginalis*.

33. *Dryopteris ctenitis* (Link) O. Ktze. Rev. 2: 812. 1891; C. Chr. Ind. 260.

Syn. *Aspidium ctenitis* Link, Hort. Berol. 2: 122. 1833!

Nephrodium ctenitis Bak. Syn. 265. 1867.

Lastrea distans Brack. U. S. Expl. Exp. 16: 192. 1854!

Aspidium squamigerum Mett. msc. (Bak. Syn. 265 nota)! (non Fée nec Mann).

Nephrodium squamigerum Rosenst. Hedwigia 43: 224. 1904.

Aspidium amaurolepis Fée, Cr. vasc. Brés. 1: 137 tab. 44 fig. 2. 1869!

Aspidium isabellinum Fée, Cr. vasc. Brés. 1: 137 tab. 45 fig. 2. 1869!

Dryopteris isabellina C. Chr. Ind. 272. 1905.

Nephrodium caripense β *squamigerum* Bak. Fl. Bras. 1²: 474. 1870.

LINK founded this species on plants cultivated in the Botanical Garden of Berlin and the type specimen (B!) belongs to a somewhat abnormal form, which after a detailed analysis of the original specimens of each was found to be identical with *A. squamigerum* Mett. and *A. amaurolepis* Fée. The species is well figured by FÉE on the plates quoted above. The rudimentary lower pinnæ of *A. isabellinum* (tab. 45 fig. 2) are not normal ones; in some specimens I have found similar abnormal pinnæ, which are not always the lower ones; in such pinnæ the lower segments only become fully developed, the costa suddenly terminating in a scaly bud.

D. ctenitis is intermediate between *D. falciculata* and *D. submarginalis* and it is very difficult to distinguish some of its forms from these species, still I think the following characters mark it sufficiently.

Leaf as dried dark-brown or red-brown, thin. Rachis clothed with dark and stiff, fibrillose scales with a long hair-like apex, shortly pubescent in the furrows above. Pinnæ rather distant, up to 20 cm long by 3—4 cm broad, the edges parallel from the base to above the middle. Costæ beneath more or less short-

hairy and more or less scaly by filiform scales, which are distinctly and sharply toothed by claw-shaped teeth; the cell-walls very dark and thick, the lumina small (fig. 3¹⁶). Under-surface often glandular. Segments patent or a little oblique, with the edges parallel, the apex truncate or bluntly rounded, entire or finely toothed, not mucronate. Veins 10—15, oblique. Sori inframedial, rarely almost medial, furnished with a persistent, reddish, glabrous or slightly ciliate and glandulose indusium.

From *D. falciculata* the present species differs by more veins in the patent, obtuse segments, inframedial sori and the different shape of the scales; from *D. submarginalis* it differs by the dark colour of the lamina and scales, obtuse segments, inframedial sori and persistent indusia.

The specimens examined can be referred to two forms:

1. forma *isabellina* (Fée).

Scales of rachis and costæ few and small, very like those of *D. submarginalis* f. *tenuifolia* but darker and more distinctly toothed (fig. 3^{16d}); rachis, costæ and both surfaces hairy by scattered, red, deciduous hairs. Pinnæ 2½—3 cm broad; segments rather oblique, finely toothed or often deeply serrate in the lower pinnæ. Veins 10—12, forked in the serrate segments; sori often nearly medial. — Stipe at base with a dense mass of soft, reddish scales.

This form, to which the original specimen of *A. ctenitis* Link seems to belong, is very closely related to *D. submarginalis* f. *tenuifolia*, from which it differs mainly by colour, structure of the scales and the persistent indusium.

Brazil: Rio, GLAZIOU nr. 2368 (C, H, Rg), 2371 (H), 2372 (H, Rg).

Minas Geraes: Lagoa Santa, WARMING (H) — Caldas, LINDBERG nr. 557 (B), Mosén nr. 2146 pt. (B, Rg).

São Paulo: Tieté, GERDER nr. 84a (R) — Toledo, SCHNAPP nr. 43 (C).

2) forma *amaurolepis* (Fée) — (*A. amaurolepis* Fée, *A. squamigerum* Mett., *Lastrea distans* Brack.)

Larger and more scaly than the preceding form, the scales larger and darker. Costæ beneath flat and sulcate, furnished with two kinds of scales: 1) lateral ones, which are red-brown and patent (fig. 3^{16b}), and 2) frontal ones, which are adpressed and almost black (fig. 3^{16c}). Both surfaces generally glabrous. Pinnæ 4 cm broad, the segments close, patent, obtuse; veins about 15; sori inframedial. — Stipe at base apparently without a dense mass of soft scales.

Between this excellent form and f. *isabellina* numerous intermediates are to be found, the two forms described being the two extremes of *D. ctenitis*.

Brazil: Rio, GLAZIOU nr. 1680, 2370 (H), Mosén nr. 100 (Rg, S), MARTIUS (Hb. Fl. Brazil nr. 324 (B), and others.

Minas Geraes: T. DE MOURA (B).

Bahia: DU PASQUIN 1851 (B). LUSCHNATH nr. 118 (B).

34. *Dryopteris submarginalis* (Langsd. et Fisch.) C. Chr. Ind. 296. 1905.Syn. *Polypodium submarginale* Langsd. et Fisch. Ic. Fil. 12 tab. 13. 1810.*Aspidium caripense* Mett. et auctt.*Nephrodium caripense* Hk. Bak. Syn. 265 et auctt.

(For other synonyms see under the different forms).

Type from S. Brazil, Sta. Catharina.

As here understood this is the most variable species of the subgenus. Some of its forms are closely related to *D. falciculata* var. *paranaensis*, others to *D. ctenitis*; certain South Brazilian forms resemble very much *D. deflexa* and an andine form is not unlike *D. refulgens*. All these forms are, however, connected by all possible intermediates, and I have found it impossible to distinguish them specifically, while they all differ, as a rule, from the related species by some few characters, which are common even to the most different forms. The species is distributed from Mexico to Peru and from N. Brazil to Uruguay, and I first succeeded in recognizing the special characters of the different forms by sorting the more than 200 specimens examined by me after locality. Then it was found that almost all specimens from each of these three regions 1) Brazil from São Paulo southwards to Argentina and Uruguay, 2) Brazil from São Paulo northwards, and 3) Andes from Mexico to Peru constantly show some peculiarities, especially in the structure of the scales, by which they differ from specimens from another region but resembling them in size, habit, colour and other characters.

D. submarginalis may be distinguished from allied species by the following characters:

Stipe at base with a very dense mass of 3—4 cm long, thin, red-yellow scales. Leaf light-green, firmly herbaceous, ciliate, lower pinnæ generally reflexed; segments oblique, rarely falcate, entire or often faintly toothed, obtuse or mucronate. Rachis and costæ beneath more or less scaly, the scales red-yellow or red-brown with a long hair-like point, their margins toothed by short, mostly not curved teeth, the cell-walls clear. Costæ beneath without hairs. Veins simple, 8—15, the basal ones running out near the sinus. Sori medial or slightly supramedial, reddish-yellow. Indusium small, reddish, glabrous, generally absent. — As a rule the surfaces are glabrous; in some specimens scattered hairs can be found mainly on the veins above, in others the under-surface is slightly glandular.

In the following I shall try to explain the recognized forms. As the species was founded on a Brazilian form I begin with this, although it is not the most developed form of the species.

A. South-Eastern forms

1. forma vera (Langsd. et Fisch. tab. 13).

Syn. *Dryopteris Sellowii* Hieron. Hedwigia 46: 324 tab. 3 fig. 1. 1907!*Dryopteris soriloba* Christ. in Fedde, Repertor. 6: 350. 1909!? *Dryopteris collina* Christ., Bull. L'Herb. Boiss. II. 7: 922. 1907.

Lamina 4—7 dcm long; pinnæ rather distant, 10—12 cm long, 2—2½ cm broad; segments oblique or often subfalcate, faintly toothed in the outer half and generally with a mucronate apex. Veins 10—23. Sori supramedial, very often confined to the outer half of the segment (*D. soriloba* Christ). Rachis and costæ more or less scaly; scales of costæ ovate with a long, hair-like point, clear and thin, their cells large with thin walls, the edges faintly and distantly toothed (fig. 3^{4a}).

This form comes near to *D. deflexa* in size, habit and colour of scales but is different by the subentire scales. It is confined to the Southern Brazilian States and the neighbour-republics; agreeing best with the original description and figure are the specimens from Rio Grande do Sul and Misiones; some of the specimens from Paraná and Sta. Catharina are intermediate between this and the following form. — *D. Sellowii* Hieron. is exactly this form.

Argentina: Tucuman, Siambon, HIERONYMUS u. LORENTZ nr. 795 pt. (B) — Misiones, Campament Bosetti, NIEDERLEIN (B); Soreto, NIEDERLEIN nr. 253 (B); Puerto Tamaren, NIEDERLEIN (B); Bonpland, EKMAN nr. 1, 2, 3 (Rg).

Uruguay: Coronilla, BERRO nr. 2382 (C, CC).

Paraguay: Colonia Elisa prope San Antonio, LINDMAN (Rg) — Cordillère de Mbatobi, Paraguari, BALANSA nr. 2917 (B, H) — Sierra de Amambay, HASSLER nr. 10454 (C, RB = *D. soriloba* Christ! and perhaps the same as *D. collina* Christ).

Brasilia: Rio Grande do Sul: Serra dos Tapes, Cascata, LINDMAN nr. A. 905 (Rg, W) — Excolonia Santo Angelo, LINDMAN nr. A. 959 (Rg) — Neu-Württemberg, Estancia L. Gomez, A. BORN-MÜLLER nr. 273 (R) — S. Leopoldo, Hamburger Berg, STÜBEL nr. 1173 (B = *D. Sellowii*). — Sta. Catharina: Blumenau, HAERCHEN nr. 49¹, 50 (R) — GOEDEN nr. 45 (R). — Paraná: S. Matheus, GÄNSLY nr. 8 u. 35 (R) — Villa Nova, ANNIES nr. 42 (R), — and others.

Intermediate forms between forma 1 and 2.

Sta Catharina: Blumenau, HAERCHEN, ROS. Fil. exsicc. nr. 153 (B, R, Rg, W).

São Paulo: Toledo, STIER nr. 32 (R), SCHNAPP nr. 30 (R), ULBRICHT nr. 55 (R) — Campinas, ULBRICHT nr. 59 (R).

2. forma *tenuifolia* (Presl).

Syn. *Lastrea tenuifolia* Pr. Epim. 37. 1849!

Aspidium caripense f. *macroloba* A. Br. Ind. sem. ht. Berol. app. 1857: 2!

Phegopteris Oreopteridastrum Fée, Cr. vasc. Br. 1: 97. 1869 (GLAZIOU 963).

Aspidium Sancti Pauli Christ, Denkschr. Akad. Wien 79: 15. 1907!

Larger than the preceding form, leaf one meter or more long, pinnæ 20 cm long by 3—3½ cm broad, often contiguous and erect, so that the leaf becomes a very compact habit. Segments slightly oblique or patent, seldom subfalcate, generally bluntly rounded at the apex and faintly toothed, sometimes mucronate. Scales as a rule fewer than in the typical form, those of the costa beneath generally hair-like consisting of a few rows of cells (fig. 3^{4b}). — Veins 12—15-jugate. Sori often medial, exindusiate (always?).

This is the common form of the mountains of the states Rio de Janeiro and Minas Geraes, where it was collected by almost all collectors. The original specimen of *Lastrea tenuifolia* Presl was collected near Rio by POHL (Herb. PRESL!);

in my Index it was identified with *D. alsophilacea* because METTENIUS referred PRESL's species to *A. alsophilaceum*. — I have examined a series of specimens and enumerate here the more important collector-numbers.

São Paulo: Villa Nova, ANNIES nr. 24 (R) — Rio Tieté, GERDER nr. 84 (R) — Campinas, HEINER nr. 516 (Rg) — Serra de Caracal, MOSÉN nr. 4620 (Rg) — WETTSTEIN u. SCHIFFNER 1901 (= *A. Sancti Pauli* Christ, C, Hb. Wien).

Rio de Janeiro: GLAZIOU nr. 963, 15767 (H).

Minas Geraes: Caldas, LINDBERG nr. 559b (B), REGNELL nr. 475a (Rg, W); MOSÉN nr. 2146 pt. 2147, 2148, 2149, 2150, 4619 (Rg) — Corrego d'Olho d'Água bei Antonio Pereira, SCHWACKE nr. 15052 (C) — Ouro Preto, SCHWACKE nr. 11291 (C); M. GOMES nr. 3113 (C).

Matto Grosso: H. SMITH (C).

Ceará: Serra de Baturité, HUBER nr. G. 137 (C).

B. Andine forms.

3. forma *caripensis* (Willd.).

Syn. *Polypodium caripense* H. B. Willd. sp. 5: 202. 1810!

Aspidium caripense f. *brachyloba* A. Br. Ind. sem. ht. Berol. app. 1857: 2!

Nearly identical with f. *tenuifolia*, but generally with smaller pinnæ (15 cm × 2½ cm) and fewer veins (10—12), which are not so close as in the Brazilian forms. The scales of the costæ beneath are never hair-like but rather uniform (fig. 3^{14c}). Underside often glandulose.

Mexico: Orizaba, WEBER (B), MÜLLER (B) — Mirador, LIEBMANN (H) — Sierra San Pedro, Nolasco, Talea etc. C. JÜRGENSEN nr. 228 (RB).

Guatemala: Coban, Alta Verapaz, v. TUERCKHEIM nr. II. 1204 (W).

Nicaragua: Cañada Yásica, Dep. Matagalpa, E. ROTHSCUH nr. 237 (B).

Costa Rica: Turrialba, DONN. SMITH nr. 5095 (C, W); Navarro, WERCKLÉ nr. 16780 (RB, CC); Juan Viñas, Reventazon Valley, 1000 m, COOK and DOYLE nr. 185 (W); J. J. COOPER nr. 372. ed. DONN. SMITH sub nr. 6018b (W).

Colombia: Caripe, HUMBOLDT (B, herb. Willd. nr. 19700); LINDEN nr. 1010 (RB).

Venezuela: Tovar, MORITZ nr. 38, 39, 207, 208 (B), 106 (C, B, S); FENDLER nr. 197 (B), Caracas, FUNCK et SCHLIM nr. 270 (RB).

Aspidium microchlaena Fée, 8 mém. 102. 1857; *Dryopteris microchlaena* C. Chr. Ind. 278. 1905 from Mexico, Orizaba, SCHAFFNER nr. 459 can, I think, with certainty be referred to this form of *D. submarginalis*. FOURNIER (Mex. pl. 1: 93) united it with *Aspidium microcarpon* Fée, 8 mém. 105, based on SCHAFFNER nr. 214 from Cordoba, Mexico. *Nephrodium crinitum* α Sod. is most probably the true *caripensis*.

4. forma *glaucescens* (Sodirol).

Syn. *Nephrodium crinitum* β *glaucescens* Sod. Cr. vasc. quit. 251. 1893.

Under-surface more or less glaucous and often glandular. Sori often found furnished with a somewhat glandulose and ciliate indusium; segments acute and faintly toothed. Otherwise like f. *caripensis*.

Ecuador: Qualea, SODIROL (C).

Colombia: La Vega, LINDIG nr. 337 (B).

Venezuela: LANSBERG (B).

Costa Rica: WERCKLÉ nr. 16756 (C).

5. var. *tarapotensis* (Hook.).

Syn. *Nephrodium tarapotense* Hook. spec. fil. 4: 107. 1862.

A form with pinnæ resembling in shape exactly those of *D. Karstenii*, with which METTENIUS identified it; it differs from that species by more veins (10—12 to a side) and lack of articulated hairs on veins and costæ beneath; from typical *D. submarginalis* it differs by its very obtuse segments.

Peru: Mt. Campaña, prope Tarapoto, SPRUCE nr. 4016 (Kew!).

6. var. *Lagerheimii* (Sod.).

Syn. *Nephrodium Lagerheimii* Sodiro, Cr. vasc. quit. 252. 1905.

Dryopteris Lagerheimii C. Chr. Ind. 273. 1905.

Large; stipe and rachis very scaly; scales of the stipe below about 5 cm long, those of the costæ beneath numerous and much broader than those of f. *caripensis*. Leaf 1 m long, pinnæ 20 cm long by 3 cm broad; segments rather falcate, finely toothed at the outer part; veins 15—17-jugate; indusium often present. In general habit not unlike *D. refulgens*.

Ecuador: Andes quitenses, LAGERHEIM, comm. SODIRO (S, C) — SPRUCE nr. 5294 (CC, H, L, RB, S).

Colombia: Cune, 1100 m, LINDIG nr. 295 (B).

Peru: RUIZ nr. 68 (B).

35. *Dryopteris Karstenii* (A. Br.) C. Chr. comb. nov. — Fig. 6.

Syn. *Aspidium Karstenii* A. Braun, Ind. sem. hort. Berol. app. 1857: 3.

Type-specimen in B!, cultivated in Hort. Berol. and raised from spores of plants collected by KARSTEN in Venezuela.

Closely related to *D. submarginalis* resembling it in the reddish scales, which form a tuft at the base of the stipes, but receding from it in the direction of *D. falciculata*. Compared with *D. submarginalis* the main characters of *D. Karstenii* are the following: Middle-sized; stipe 3¹/₂ dcm long, like rachis clothed with hairs, hair-shaped scales and broader scales. Lamina 5—6 dcm long, 2—2¹/₂ dcm broad; largest pinnæ 10—12 cm long, 2—2¹/₄ cm broad; both sides throughout with short, scattered, reddish hairs, costæ beneath furnished with hairs and scales and with all intermediates between these two kinds of trichomes (fig. 3¹⁵). Segments close, slightly oblique, entire, broadly obtuse and often emarginate, upper basal one often quite free and a little shortened. Veins 6—8-jugate, sori medial or a little supra-medial furnished with a persistent, ciliate indusium.

— “Truncus erectus sensim supra terram elatius demum fere pedalis una cum phyllopodiiis laxius dispositis paleaceus” (A. BRAUN l. c.), while the caudex of *D. caripensis* is described thus: “truncus erectus supra terram elevatus demum semipedalis et altior una cum phyllopodiiis satis confertis dense paleaceo-lanatus paleis valde elongatis (fere pollicaribus) linearibus in pilum excurrentibus” (A. BRAUN l. c. pag. 2).

From *D. falciculata* and *D. nigrovenia* our species differs by the shape and structure of the scales.

Venezuela: MORITZ nr. 209, LANSBERG, GOLLMER, (B), Puerto Cabello, KARSTEN (C).

36. *Dryopteris deflexa* (Klf.) C. Chr. Ind. 261. 1905.

Syn. *Polypodium deflexum* Klf. Enum. 114. 1824.

Polypodium vestitum Raddi, Opusc. sci. Bol. 3: 288. 1819; Pl. Bras. 1: 24 tab. 36. 1825 (non Forst. 1786).

Nephrodium vestitum Bak. Syn. 265. 1867.

Aspidium Raddianum Mett. Pheg. u. Aspid. 91 nr. 221. 1858.

Nephrodium Raddianum Hk. sp. 4: 98 tab. 245. 1862.

Aspidium basilare Fée, Cr. vasc. Brés. 1: 135 tab. 43 fig. 2. 1869!

Type specimen from Brasilia, MERTENS communicavit (not seen). It is, however, sure that *P. deflexum* Klf. is identical with *P. vestitum* Raddi; the terms of the original diagnosis "costis venisque infra paleis lacero-ciliatis tectis, soris venae adproximatis" show it sufficiently. Whether *Polypodium lepigerum* Schrad. Gött. gel. Anz. 1824: 868 is the same, as suggested in Ind. Fil., is questionable. The short diagnosis agrees also with other species of this group; perhaps it is identical with var. *Aschersonii* (see below).

A very distinct species at once to be distinguished from allied species by the very scaly rachis and costæ and costulæ beneath; the scales are light flat, appressed, formed by large clear cells and with very long hairlike fringes on the margins (fig. 3¹¹). By this last character it differs from the more scaly forms of *D. submarginalis* f. *vera*, which are very similar *D. deflexa* in size and colour of the scales; still *D. deflexa* seems to want the dense tuft of scales at the base of the stipe. — Lower pinnæ reflexed; veins about 8 to each side, the basal pair reaching the margin above sinus. Sori inframedial, often close to the costa (*A. basilare* Fée), furnished with a small deciduous indusium. — Leaf-tissue hairless, underside sometimes slightly glandular.

A fairly constant species, apparently common in the mountains near Rio. I have seen the following specimens:

Rio: SELLOW nr. 680 (B); RIEDEL (B, H, W); MOSÉN nr. 97, 2704 (H, Rg), 2703 (Rg); GLAZIOU nr. 2373 (H), 2374 (C, H, Rg); GOELDI (C); MIKAN (Hb. PRESL).

Parahyba: GOELDI (C).

var. *Aschersonii* Mett. msc.

Differs from the type by the sessile pinnæ and persistent indusia; it is still more scaly than the type, and the scales are formed by small cells with very flexuose cell-walls.

Prov. Espirito Santo, an der Minasstrasse, Prinz zu WIED 1816 (B).

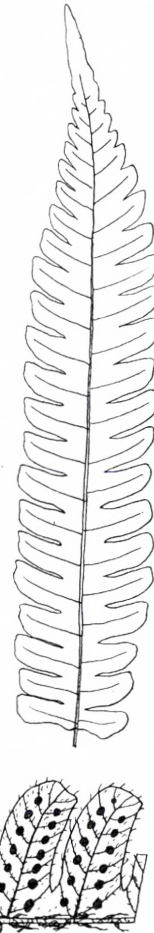


Fig. 6. *D. Karstenii* (A.Br.) C. Chr. Pinna $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$ (MORITZ 209).

37. *Dryopteris Anniesii* Rosenstock, Hedwigia **46**: 118. 1907. — Fig. 7.

Type from Brasilia, Rio Grande do Sul, Campestre do Seivaes, leg. JÜRGENS u. STIER nr. 158 (R!).

A large species; leaf 1 m or more long with numerous, alternate pinnæ, which are up to 20 cm long by $2\frac{1}{4}$ — $2\frac{1}{2}$ cm broad, the lower ones not or a little shortened. Segments patent or subfalcate, generally broadest towards the apex, separated by round, broad sinuses, the lower ones free or nearly so. Veins 12—15-jugate. Sori numerous subcostular or at least distinctly inframedial, reddish, furnished by a persistent, rather large, reddish, glabrous indusium. Leaf tissue of both surfaces glabrous, the underside often finely glandular, margins ciliate. — In general habit the species is not unlike *D. ctenitis*, probably its nearest ally, which it also resembles in the dense tuft of scales at the base of the stipe, its inframedial sori and persistent indusia, but it differs considerably by the structure of the scales; these are numerous, reddish, soft and clear, not unlike those of *D. deflexa*, but

their margins are toothed only not long-fimbriated (fig. 3¹³). — Stipe and rachis dark-coloured densely clothed with adpressed, darker scales.

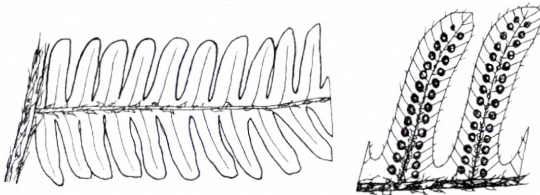


Fig. 7. *D. Anniesii* Ros. Base of pinna $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$. (Orig.)

Paraná: Villa Nova, ANNIES nr. 89 (= Rosenstock: Fil. Exsicc. Austro-Brasil. nr. 89 (B, C, R, Rg, W). — Serro do Mar. inter Ypiranga et Volta Grande in terra silvosa, DUSÉN nr. 3625 (C, Rg).

var. *Ottonis* Rosenstock in herb.

Lamina ad basin sensim decrescens: pinnis inferioribus 3—4 jugis reflexis, infimis 4—5 cm longis; paleis costarum structura f. *typicae* sed ad marginem ciliis nonnullis instructis, fere ut in *D. deflexa*.

Sta Catharina: Joinville, MÜLLER (R); GERDER nr. 80a (R).

38. *Dryopteris fenestralis* sp. nov. — Fig. 8.

Type specimen from Brasilia: Rio, Petropolis, Alto do Imperador, leg. GLAZIOU nr. 7026, $2\frac{1}{3}$ 1878 (H, also B).

Stipitibus $4\frac{1}{2}$ dcm longis, $\frac{1}{2}$ cm crassis, rufis, ad basin paleis 2—3 cm longis, 3—4 mm latis densissime vestitis, supra cum rachi paleis sordide brunneis tenuissimis, 2—3 mm latis, 8—10 mm longis, laxe dispositis dense vestitis. Lamina ovato-lanceolata, ca. 7 dcm longa, infra medium $3\frac{1}{2}$ —4 dcm lata, atro-viridi, firmo-herbacea. Pinnis alternis, inferioribus petiolulatis, acuminatis, ad 20 cm longis, $3\frac{1}{2}$ cm latis, utrinque costis exceptis glabris, supra ad costas rufo-pilosis et squamis parvis longis filiformibus nonnullis instructis, infra ad costas costulas venasque squamis tenuibus latis vestitis, fere ad costam incisus vel inferioribus versus basin fere pinnatis. Laciniis falcatis basi recte truncata, apice acuto serrato, marginibus

parallelis, 4 mm latis, basali posteriore aequali vel parum reducta, anteriore sæpe valde prolongata lobata, rachi parallela vel eam tegente. Venis 15—20-jugis, parum obliquis. Soris parvis medialibus vel paulo inframedialibus, exindusiatis (?); sporangiis pilis articulatis intermixtis.

Allied to *D. Anniesii*, from which it differs by its numerous, not adpressed, dirty-brown, very large scales of stipe and rachis and by its small, medial sori without distinct indusia. The scales of the costæ beneath are larger than in any other species and formed by large, isodiametric cells with thin walls; their margins are irregularly toothed. Seen in the microscope a scale resembles not a little an old window, hence the specific name (fig. 3¹²).

To this species I refer a plant from Sta. Catharina: S. Joaquin, leg. SPANNAGEL nr. 174 (C, R); it is smaller but still more scaly and the scales larger and reddish-yellow; base of stipe with a dense tuft of very large, thin scales, the largest 3 cm long, 6 mm broad. It can be named var. *Spannagelii* Ros.

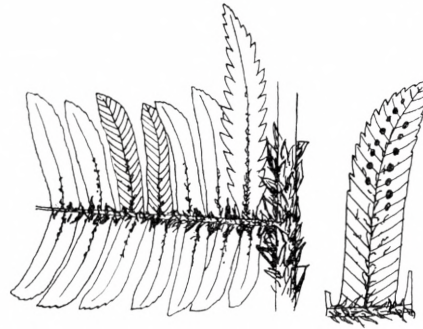


Fig. 8. *D. fenestralis* n. sp. Base of pinna $\times \frac{4}{5}$ and segment $\times 1\frac{1}{2}$. (Orig.)

39. *Dryopteris vellea* (Willd.) O. Ktze. Rev. 2: 814. 1891; C. Chr. Ind. 300.

Syn. *Aspidium velleum* Willd. sp. 5: 255. 1810.

Nephrodium velleum Desv. Prod. 261. 1827; Bak. Syn. 265.

Nephrodium aureovestitum Hk. sp. 4: 101 tab. 246. 1862.

This species was founded on PLUMIER tab. 49, which plate illustrates a plant from San Domingo; it is probable that *N. aureovestitum* Hk. based on LINDEN nr. 1901 from Cuba, Mt. Libanon is the same, but I have, however, not seen any Cuban specimen. It seems to be a rare species, I have seen only a single specimen from Jamaica, leg. JENMAN (W); according to JENMAN it is common in forests on the Manchester mountains at 2000 feet altitude.

D. vellea alone represents the subgenus in the West-Indies. It resembles in size *D. deflexa*, but in the scales much more *D. cirrhosa* var. *eriocaulis*, from which it differs by the glabrous leaf-tissue and fewer veins (8—10). The scales are reddish, entire with a pocket-shaped base, not hair-pointed (fig. 3⁸).

40. *Dryopteris cirrhosa* (Schum.) O. Ktze. Rev. 2: 812. 1891; C. Chr. Ind. 257.

Syn. *Aspidium cirrhosum* Schum. Vid. Selsk. Skr. 4: 231. 1827.

Nephrodium crinibulbon Hk. sp. 4: 92 tab. 244. 1862.

var. *eriocaulis* (Fée) C. Chr. comb. nov.

Syn. *Aspidium eriocaulon* Fée, Cr. vasc. Br. 1: 136 tab. 4 fig. 1. 1869.

Nephrodium eriocaulon Bak. Syn. 495. 1874.

Dryopteris eriocaulis O. Ktze. Rev. 2: 812. 1891; C. Chr. Ind. 263.

Nephrodium ramentaceum Bak. Fl. bras. 1^z: 473. 1870.

Type specimen of *D. cirrhosa* from Guinea, tropical West Africa, leg. THONNING (H!), of var. *eriocaulis* from Brazil, leg. GLAZIOU nr. 2369 (H, Herb. COSSON, Paris!).

This is the only species of the whole subgenus, which I do not hesitate to unite with an Old-World's species; the very handsome Brazilian *D. eriocaulis* is nearly quite identical with the African *D. cirrhosa*; I see no other differences than the African form being less scaly and having more acute segments and smaller sori; in shape of scales, pubescence, texture, position of sori etc. the two forms quite agree.

The South-American form var. *eriocaulis* is very constant and the most beautiful and well-marked form of the whole subgenus; its essential characters are the following:

Stipe beneath with a tuft of scales, upwards like rachis very densely clothed with red-yellow, patent or often characteristically reflexed, entire, hairpointed scales. Lamina in size equal to *D. ctenitis* and *D. Anniesii*, shortly hairy throughout on both surfaces, beneath also glandulose; costæ beneath densely clothed with red scales, which generally stand at open angles to the costa and narrow from a sub-bullate base rather suddenly into a long narrow point with revolute but quite entire edges (fig. 3⁹). Segments oblique or subpatent, obtuse or subacute, often faintly toothed, 4¹/₂—5 mm broad. Veins 10—12. Sori inframedial or almost medial, furnished with a persistent, red indusium, which is shortly hairy and sparsely glandulose.

Brasilia: Parahyba, GOELDI (C) — Rio, GLAZIOU nr. 2369 (H), Sellow (B), LENORMAND (B) — São Paulo: Bella vista ad flumen Rio Pardo, WETTSTEIN u. SCHIFFNER 1901 (C, Hb. Wien) — Rio Tieté, GERDER nr. 80 (R).

Paraguay: HASSLER (C).

Besides these specimens I have seen numerous others originating from plants cultivated in Berlin 1862 and Kew 1868 under the names *Lastrea vestita* J. Sm. and *L. vulpina* Kl., which latter very proper name has not been published.

41. *Dryopteris nigrovenia* (Christ) C. Chr. Ind. 279. 1905 — Fig. 9a.

Syn. *Nephrodium nigrovenium* Christ, Bot. Gaz. 20: 545. 1895.

Aspidium setosum Kl. Linn. 20: 371. 1847 (description; non Sw.).

Aspidium deltoideum Fourn. Mex. pl. 1: 93. 1872 (non Sw.).

Type from Honduras: San Pedro Sula, Depart. Santa Barbara, 1000', leg. THIEME, ed. DONNELL SMITH nr. 5646 (W!, C).

An andine representative of *D. falciculata*, resembling it in size, habit and texture but differing by the following characters: Stem proportionally long, 5 dcm; lamina 5 dcm long 2 dcm broad, not ciliate and not glanduloso-pubescent, but both surfaces with scattered, short and thick hairs of the common type. Rachis and costæ beneath with several, small, dark-brown scales, which from an almost circular, subbullate basal part formed by large isodiametric cells and often furnished with some long cilies are suddenly narrowed into a long, narrow, entire apex, which is formed by longitudinal, narrow cells with thick cell-walls (fig. 3³). Segments subpatent or a little oblique, not falcate, generally distinctly serrate especially towards the mucronate apex, the posterior basal one of the lower pinnæ often somewhat shorter, the anterior basal one of the upper pinnæ generally enlarged. Veins 6—8 to each side, simple, sometimes dark-coloured. Sori medial or inframedial, small, with a subsistent, glabrous indusium. — In some specimens the basiscop half of the basal pinnæ is much enlarged with deeply lobed segments and furcate veins.

D. nigrovenia is distributed from Mexico to Ecuador and it varies only a little; the form described as *A. setosum* Kl. differs only by its somewhat longer petioles of the lower pinnæ; to that form belong the specimens from Venezuela-Ecuador. I have seen the following specimens:

Mexico: San Luis Potosi, Hac. of Tamasopo, PRINGLE nr. 3957 (B, C, H, S, W); Vallée de Córdoba, Bourgeau nr. 1644 (B, H, S, W = *A. deltoideum* Fourn.), H. FINK nr. 55 part. (W).
Honduras, San Pedro Sula, THIEME ed. DONN. SMITH nr. 5646 (C, W).
Costa Rica, WERCKLÉ 1904 (C); Turrialba, A. et C. BRADE nr. 344 (R); Grenadilla Finca Hermes, A. et C. BRADE nr. 414 (R).
Panama: MAXON nr. 5172 (W).
Colombia: Santa Marta, H. H. SMITH nr. 2581 (C).
Venezuela: Tovar, MORITZ nr. 204 part. (B, C, S, = *A. setosum* Kl.), nr. 457 (B).
Ecuador: Andes quitenses, SPRUCE nr. 5721 (CC, RB).

Further I refer here a specimen from

Trinidad: FENDLER nr. 125 (W).

which, however, is very near *D. falciculata*, especially the specimens of that species from Parahyba and Guiana; thus it seems that the two species are connected by intermediate forms occurring in Northern South America, where they meet.

42. *Dryopteris Tonduzii* (Christ) C. Chr. Ind. 664. 1906.

Syn. *Aspidium Tonduzii* Christ, Prim. Fl. Costaric. III. 34. 1901.

Type from Costa Rica: Forêto de Tuis, TONDUZ nr. 11333 (C! also W).

Intermediate between *D. nigrovenia* and *D. Lindeni* resembling the former in venation the latter in size and colour. It differs from *D. nigrovenia* by its thin, light-green leaf, which is about 25 cm long by 13 cm broad, the leaf-tissue of both surfaces glabrous but costæ and costulæ with scattered, short, thick hairs. Stipe up to 25 cm long, slender, throughout glanduloso-pubescent and fibrillose by thin,

patent, glossy scales, the lower ones being larger, ovate-acuminate, the upper linear and hair-pointed with a bullate base. Rachis similarly slender, glanduloso-pubescent and somewhat scaly. Pinnæ 5—8 cm long, the costæ and costulæ beneath more or less glanduloso-pubescent and furnished with bullate-acuminate scales

much similar to those of *D. nigrovenia*. Segments oblique or falcate, the basal ones somewhat reduced, the larger serrate. Veins 5—6-jugate, very oblique, reaching the margins. Sori small, medial or supramedial, indusium small, fugacious, glandulose.

D. Lindeni is different by the veins not reaching the margins, *D. strigilosa* by different scales and glandular under surface.

Besides the type-specimen I refer here:

Costa Rica: Meseta, 2000 m, ALFARO nr. 16863 (C, RB), NAVARRO, WERCKLÉ (C).

Guatemala: Volcan Jumaytepeque, Depart. Santa Rosa, 6000 ft., HEYDE et LUX, ed. DONN. SMITH nr. 4425 (W).

43. *Dryopteris strigilosa* Davenport, Bot. Gaz. 21: 257. 1896; C. Chr. Ind. 295. — Fig. 10a.

Syn. *Aspidium strigilosum* Dav. l. c.

Type from Mexico: Vera Cruz, dry calcareous cliffs, barranca of Metlac, 3000 ft., leg. PRINGLE nr. 6077 (C, H, S, W).

Near *D. Tonduzii*, resembling it in size, colour and texture, but the lower pinnæ incised to costa and the scales different. The scales of stipe and rachis, very numerous at the base of the stipe, are up to 1 cm long, patent, dark-brown, glossy, very narrow and scarcely widened at base, entire but the margins furnished with small, capitate glands (fig. 3^{4a}). When the scales fall they leave a scar by which the stipe becomes rough. Scales of the costæ beneath are similar but smaller

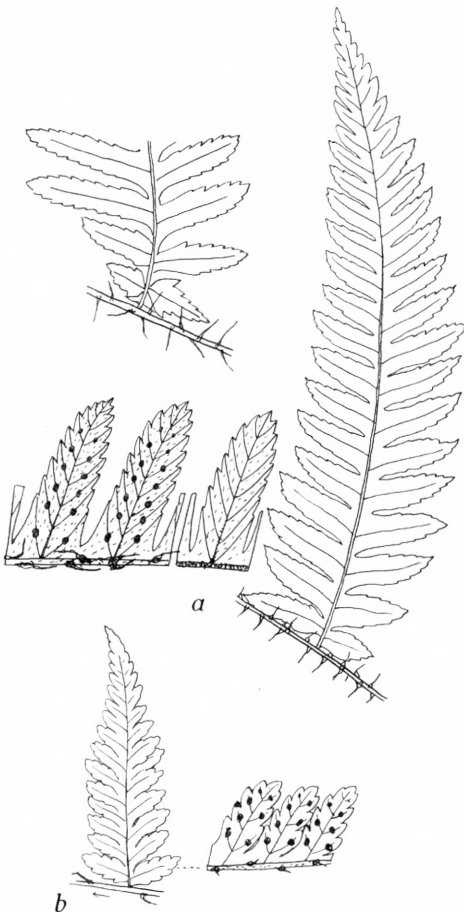


Fig. 9 a. *D. nigrovenia* (Christ) C. Chr. Middle pinna and base of the second pinna from below, $\times \frac{4}{5}$, two segments seen from the underside and one seen from above, $\times 1\frac{1}{2}$ (orig.). — b. *D. Lindeni* (Kuhn) O. Ktze., middle pinna $\times \frac{4}{5}$ and three segments $\times 1\frac{1}{2}$ (orig.).

with a broader, still scarcely bullate base (fig. 3^{4b}). Whole leaf densely glandular-pubescent. Lower pinnæ about 4 cm long, broadest at base, fully pinnate at the lower half; segments (or pinnules) distinctly serrate, generally truncate at apex, veins 4—5 to each side, simple, reaching the margin; sori inframedial furnished with a glandulose indusium.

Polypodium subincisum Mart. et Gal. Mém. Acad. BRUX. 15: 43. 1842 from Vera Cruz, GALEOTTI nr. 6290 (B, a single leaf only) is rather this species than the following, to which KUHN referred it.

var. *Cookii* Maxon in sched. (pro specie).

Exactly *D. strigilosa* in pubescence and scales but in cutting almost identical with *D. Tonduzii*; all pinnæ pinnatifid only and the segments entire or faintly toothed, oblique and acute, the basal ones shortened. Lower pinnæ with rather long petioles.

Guatemala: Alta Verapaz, near the Finca Sepacuite, on limestone cliffs, Cook and GRIGGS nr. 507 (W).

44. *Dryopteris Lindeni* (Kuhn) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 275 — Fig. 9b.

Syn. *Aspidium Lindeni* Kuhn, Linnaea 36: 116. 1869.

Nephrodium Lindeni Bak. Syn. 493. 1874.

Aspidium Lindeni Fourn. Mex. Pl. 1: 97. 1872.

Dryopteris Moreletii C. Chr. Ind. 278. 1905.

Type from Mexico: Tabasco, Teapa, leg. LINDEN nr. 1489 (Kew!, Mus. Paris!).

This beautiful species was described under the same name both by KUHN and FOURNIER. The type-specimen in Mus. Paris from Teapa, LINDEN sine num., after which FOURNIER named his new species, is exactly identical with the Kew specimen of LINDEN nr. 1489, which I regard as the type-number of KUHN's species.

Rhizome oblique; stipites fasciculated, 15—20 cm. long, slender, at base clothed with numerous, brown, entire, from a broad base narrowed into a hair-like apex, patent scales, upwards like rachis deciduously scaly by similar but shorter scales, which from a bullate base are suddenly contracted into a long hair-shaped, rather flaccid apex, 2—2 mm long. Lamina lanceolata, 15—25 cm long, 6—9 cm broad, thinly herbaceous, fresh-green, both surfaces (costæ above excepted) glabrous, costæ beneath with several small, light-brown, bullate scales. Pinnæ 15—20-jugate, short-stalked, the lower ones somewhat abbreviated, middle ones 3—4 cm long, 1—1¼ cm broad, broadest at the base, incised to a narrow wing to the costa into oblique, obtuse, distinctly serrated segments. Veins 2—3-jugate, very oblique and not reaching the margin, simple or more commonly furcate with a posterior branch running into the teeth or lobe and an anterior one which is very short and soriferous. Sori small, medial, medial apparently apical on the short anterior branch of the furcate veins or dorsal somewhat below the apex of the simple veins, furnished with a persistent, reniform, glandulose indusium.

D. Lindeni is certainly a most distinct species, by its scales not essentially different from *D. Tonduzii*; it is very closely related to *D. Savinii*, resembling it in colour, shape of scales and its peculiar venation, by which it at once can be distinguished from the three preceding species. Besides the type-specimen I have only seen one more, which is absolutely identical.

Guatemala; Alta Verapaz, Cubilquitz, 350 m, v. TUERCKHEIM nr. II 839 (W).

45. *Dryopteris Salvini* (Bak.) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 290. — Fig. 10b.
Syn. *Nephrodium Salvini* Bak. Syn. Fil. 274. 1867.

Type from Guatemala, SALVIN et GODMAN (Kew!), and identical specimens

from the same country, Alta Verapaz, Cubilquitz, 350 m were collected by H. v. TÜRCKHEIM, ed. DONN. SMITH nr. 8647 (C, W).

In most characters: scales, venation, shape of lamina nearly identical with *D. Lindeni*, but a larger and more robust plant, lamina up to 50 cm long by 12 cm broad, the stipe and rachis rather strong; segments more deeply serrated with about 5 pairs of furcate or simple veins; basal segments nearly quite free. Indusium large, persistent.

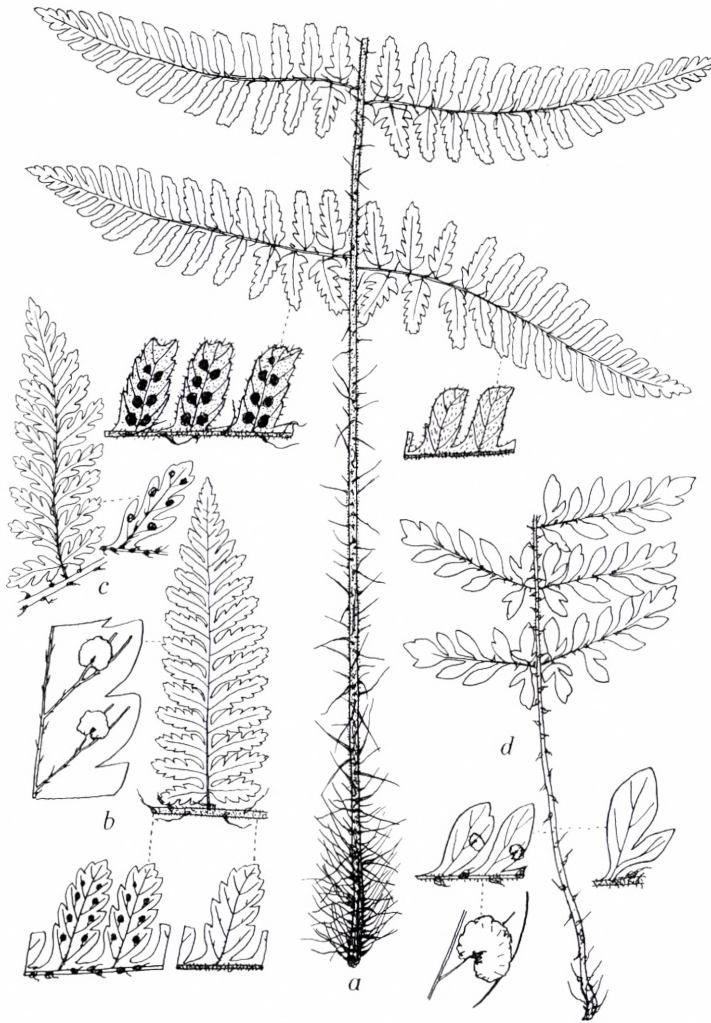


Fig. 10. a. *D. strigilosa* Dav. Stipe and base of lamina of a larger leaf, $\times \frac{4}{5}$, three segments seen from the underside and two others (from an upper pinna) seen from the upperside, $\times 1\frac{1}{2}$ (orig.). — b. *D. Salvini* (Bak.) O. Ktze. Middle pinna, $\times \frac{4}{5}$, two segments seen from the underside and one seen from the upperside, $\times 1\frac{1}{2}$; fragment, showing venation and indusia (J. D. S. 8647). — c. *D. lanceolata* (Bak.) O. Ktze., pinna $\times \frac{4}{5}$ and pinnula $\times 1\frac{1}{2}$ (orig.). — d. *D. lanceolata* var. *tricholepis* (Bak.). Lower part of a leaf $\times \frac{4}{5}$, two segments seen from the underside with a sorus more magnified and a basal pinnula seen from the upperside, $\times 1\frac{1}{2}$. (J. D. S. 626.)

46. *Dryopteris lanceolata* (Bak.) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 273. — Fig. 10c.

Syn. *Nephrodium lanceolatum* Bak. Syn. 498. 1874.

Type from Guatemala, Coban, SALVIN et GODMAN (Kew!), also Pansamalá, Depart. Verapaz, 3800 ft., TÜRCKHEIM ed. DONN. SMITH nr. 626 (B, C, W).

In size, texture and scales not materially different from *D. Salvini*, distinguished by its partly bipinnate lamina and larger, obtuse tertiary lobes. Pinnæ

rather distant, short-stalked, fully pinnate in the lower half; segments or pinnules oblique, deeply lobed with 2—3 oblique, obtuse lobes on each side, those of the anterior side the largest, the anterior side generally entire in the lower half and decurrent at base. Veins 2—4 to a side, simple, one to each lobe and not reaching the margin, each bearing a sorus, which is placed at the base of each lobe. Indusium very large, glabrous, brown, persistent. — Surfaces (costæ above excepted) glabrous, but costæ and often also costulæ beneath furnished with rather numerous bullate scales, which resemble those of the two preceding species but are larger and more numerous. Scales of stipe and rachis rather many, from a broad, subbullate base ovate-acuminate, brown, glossy.

var. *tricholepis* (Bak.) — Fig. 10 d.

Syn. *Nephrodium tricholepis* Bak. in Hemsley, Biol. Centr. Amer. 3: 651. 1885.

Dryopteris tricholepis C. Chr. Ind. 298. 1905.

A smaller plant than the type, otherwise scarcely different. Lamina 10—15 cm long, 3—5 cm broad at base where generally broadest (type 25 × 10 cm, somewhat narrowed below). Pinnæ pinnate; pinnules mostly fully entire, ligulate, or the larger ones with one or two obtuse lobes. Scales typical in shape; in several specimens they are of a peculiar, metallic lustre, not unlike the scales of *Polypodium moniliforme*. Sori often one or two only to each segment or pinnule.

Guatemala: Mts. of Verapaz, SALVIN (Kew!, type-specimen); Pansamála, Alta Verapaz, 3800 ft., DONN. SMITH nr. 1563 (W) and v. TÜRKHEIM ed. DONN. SMITH nr. 626 (B, C, W); near the Finca Sepacuite, Senaju, COOK and GRIGGS nr. 482 (W).

I have not seen TONDUZ nr. 13764 from Costa Rica, Nicoya, by CHRIST referred to *Aspidium tricholepis* (Bak.) (Bull. L'Herb. Boiss. II. 5: 259).

var. *deltoideo-lanceolata* n. var.

Lamina decidedly deltoid in outline, 20 cm long, 8 cm broad at base. Basal pinnæ the largest with the lower side enlarged with pinnules 1½ cm long, 6 mm broad and nearly incised to the midrib into oblique, ligulate tertiary segments. Segments or pinnules of upper pinnæ mostly entire, the upper basal one large and broad.

A characteristic form, in most characters agreeing with var. *tricholepis* but tending to a tripinnate state and approaching the following species, which however is very different in venation and scales.

Guatemala: Alta Verapaz, Coban, H. v. TÜRKHEIM nr. II. 1621 (W).

47. *Dryopteris Hemsleyana* (Bak.) C. Chr. Ind. 270. 1905.

Syn. *Polypodium Hemsleyanum* Bak.; Hemsley, Biol. Centr. Amer. 3: 660 tab. 108. 1885.

Type from Guatemala: Chilasco, GODMAN and SALVIN (Kew!).

In its most developed form a very distinct species but in minute characters not essentially different from *D. nigrovenia* and *D. Lindenii*. Stipe, rachis and costæ beneath with many, castaneous, narrow scales, which have a broad, but scarcely bullate base and a long filiform apex, which is sometimes ciliated. Stipes fasciculated from an erect rhizome, 25—35 cm long, castaneous, glossy. Lamina deltoid, 20—30 cm long, firmly herbaceous, dark-green, glabrous, nearly tripartite in the most developed form. Basal pair of pinnæ much the largest, up to 15 cm long, bipinnatifid, their basiscop pinnulæ much enlarged, 4—6 cm long; incised nearly to the costa into oblong, acute, entire or faintly toothed segments, their acroscop pinnulæ smaller often only 1 or 1½ cm long, sometimes not quite free, serrated or lobed halfway down to the midrib. Other pinnæ pinnatifid or fully pinnate at the base, 6—8 cm long, 2—2½ cm broad, equal-sided, their segments acute, entire or toothed in the outer part. Veins 5—8, simple, reaching the margin. Sori infra-medial, small, apparently exindusiate.

Guatemala: Zamorora, Depart. Santa Rosa, 5500', HEYDE et LUX, ed. DONN. SMITH nr. 4662 (B, W) — Pansamalá, Depart. Alta Verapaz, 4000', H. v. TÜRKHEIM, ed. DONNELL SMITH nr. 1057 (B, W).
 Costa Rica: Tablazo, 1900 m, BIOLLEY nr. 64 (C, CC, W); BRADE nr. 144 (R) — Surubres, BIOLLEY (W) — La Palma, WERCKLÉ nr. 17078, 17087 (C, CC, W) — Bord de l'aguacaliente 1300 m, PITTIER nr. 2416 (B) — Forests of Virris, near la banilla, 800 m, BIOLLEY (W).
 Panama: MAXON nr. 5412, 5435 (W).

48. *Dryopteris honesta* (Kze) C. Chr. Index 271. 1905. — Fig. 11 b.

Syn. *Polypodium honestum* Kunze, Linnaea 9: 49. 1834.

Phegopteris honesta Mett. Pheg. u. Aspid. nr. 59. 1858; Ettingsh. Farnkr. 164 tab. 106 fig. 3, 7, 13.

Polypodium fibrillosum Bak. Syn. 307. 1867.

Dryopteris fibrillosa C. Chr. Ind. 264. 1905.

Type from Peru, prope Pampayaco, leg. POEPPIG. — I have not seen an authentic specimen of the type-collection, but the three figures of ETTINGSHAUSEN quoted above, which agree excellently with the descriptions of KUNZE and METTENIUS, illustrate a form that is quite identical with a specimen in Herb. Mus. Paris of SPRUCE'S collection nr. 4772 from Tarapoto, Peru, the type-number of *P. fibrillosum* Bak. The same form was collected in Bolivia, Antahuacana, O. BUCHTIEN nr. 2191 (R).

Stipe below densely clothed with patent 1—2 cm long, narrow and acute, castaneous or black-brown, faintly toothed scales. Pinnæ opposite, short-stalked, 10 cm long by 3 cm broad, at distances of 6—7 cm, the lowest pair deflexed with their lower side somewhat enlarged. Rachis and costæ beneath furnished with several, narrow, linear-acuminate, black-brown, faintly toothed scales (fig. 3¹⁷), costæ on both sides sparsely hairy or almost glabrous, surfaces otherwise glabrous. Texture firmly herbaceous, colour brownish, leaf-tissue finely pellucido-punctate. Segments broad, obtuse, shallowly repand or crenate, the basal posterior one of the

lower pinnæ nearly or quite free, lobato-pinnatifid. Veins about 7—8 to a side, once or twice forked, the branches occasionally anastomosing, not reaching the margin. Sori at the base of the anterior branch of the vein, small, a little oblong exindusiate.

In general habit, colour and texture very like *D. refulgens* but totally different in venation and scales and much more deeply cut.

49. *Dryopteris yungensis* Christ et Ros.; Rosenstock in Fletde. Repert. 5: 234. 1908. — Fig. 11 a.

Type from Bolivia: Yungas australis, Sirapuya pr. Yanacachi, 2000 m, leg. O. BUCHTIEN nr. 493 (auth. specim. in RB!).

Closely related to *D. honesta* and perhaps not specifically distinct. It differs by the position of the sori, which are placed at the middle of the anterior branch of the forked vein, and by the structure of the scales of rachis and costæ beneath, which are broader, yellowish, the cells with large, clear lumina (fig. 3¹⁸). In all other respects the two species are nearly identical.

50. *Dryopteris leptosora* C. Chr. Index 274. 1905. — Fig. 11 d.

Syn. *Nephrodium microsorum* Hook. spec. fil. 4: 106. 1862; Syn. fil. 271.

Dryopteris microsora O. Ktze. Rev. 2: 813. 1891.

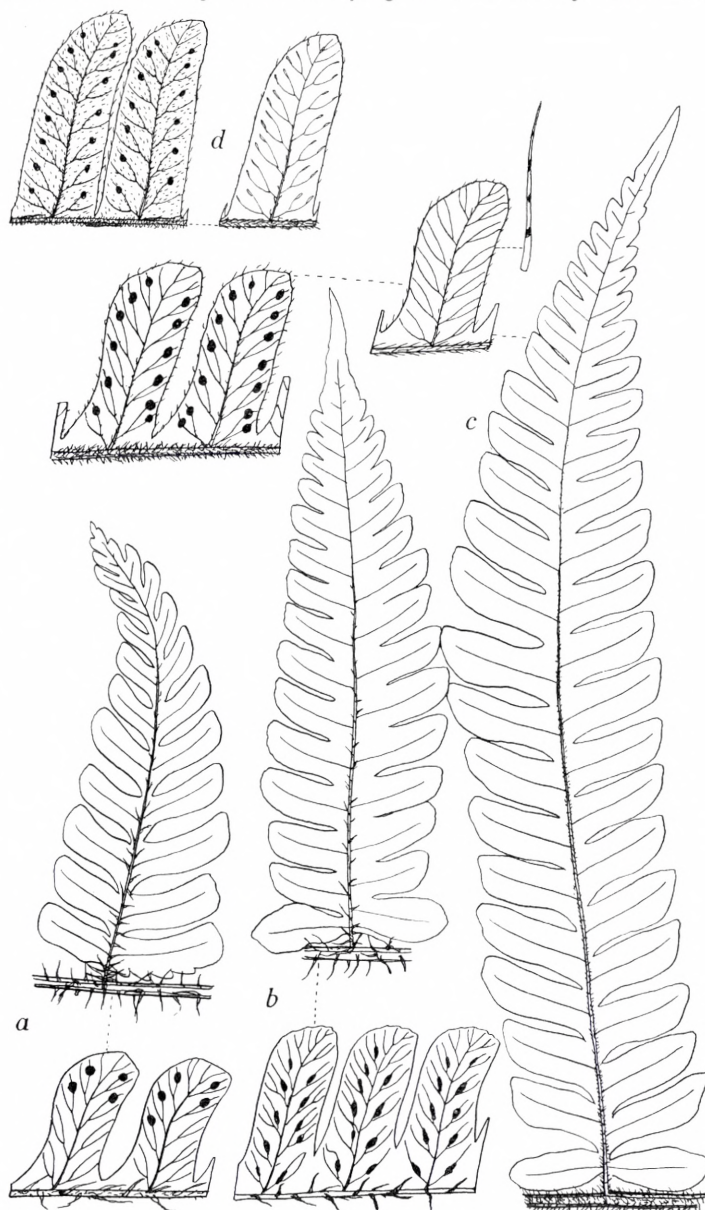


Fig. 11. a. *D. yungensis* Christ. et Ros. (orig.). — b. *D. honesta* (Kze.) C. Chr. (SPRUCE 4742) — c. *D. platyloba* (Bak.) C. Chr. (orig.) — d. *D. leptosora* C. Chr., two segments seen from the underside and one seen from above (orig.) — All pinnæ $\times \frac{4}{5}$, segments $\times 1\frac{1}{2}$.

Type from Ecuador, Chimborazo, SPRUCE sine num. (Kew!).

Stipe 35 cm long, $\frac{1}{2}$ cm thick, trisulcate above, throughout (at base densely) fibrillose by narrow, lanceolate, hair-pointed, toothed, brown, glossy scales. Lamina bipinnatifid or subbipinnate, 60—70 cm long, grass-green, firmly herbaceous, finely pellucido-punctate; rachis fibrillose like the stipe and densely brown-tomentose above by short, articulated hairs. Pinnæ 12—15 cm long, $3\frac{1}{2}$ —4 cm broad, short-stalked, the lower ones not reduced; upper surface glabrous, the costæ and basal part of the costulæ excepted, which are densely setose by antrorse, subulate, articulated hairs; costæ and costulæ beneath rather densely pubescent by patent, short subulate hairs, which are unicellular or consisting of two or rarely three cells, lower part of costæ fibrillose by narrow, brown, hair-like scales, leaf-tissue minutely pubescent by very small hairs. Pinnæ incised nearly or the lower ones quite to the rachis into close, patent, obtuse, entire or shallowly crenated segments, 6 mm broad; basal segments reduced. Veins distant, rather indistinct, 7—8-jugate, most of them forked with the branches not reaching the margin but terminating in a hydathod which is seen on the upperside within the edge as an oblong, pale-brown dot. Sori small, on the middle of the anterior branch of the forked vein, exindusiate, HOOKER says (l. c. 107): “involucre minute but apparently persistent reniformi-rotundate”; in the original specimen the sori are young and only a few of the sporangia developed; the receptacle bears rather many short, reddish, articulate hairs, which in the dried plant may be mistaken for a small indusium.

A very distinct species of uncertain relationship. It differs from the following species by its colour and especially by its upper pinnæ, which are not broadly adnate to rachis with the lower basal segments decurrent.

51. *Dryopteris platyloba* (Bak.) C. Chr. Index 285. 1905. — Fig. 11 c.

Syn. *Polypodium rotundatum* Hk. spec. 4: 238. 1862 (non Willd.).

Polypodium platylobum Bak. Syn. 307. 1867.

Polypodium biseriale Bak. Syn. 309. 1867, pro parte.

Polypodium tarapotensis Bak. Syn. 505. 1874.

Dryopteris tarapotensis C. Chr. Ind. 297. 1905.

Type from Peru, Tarapoto, Mt. Guayrapurima, SPRUCE nr. 4656 (Kew!, also RB).

In Syn. Fil. BAKER cited SPRUCE nr. 4656 as type-number for his three species quoted above. I have the original-specimens of all three species for examination from Kew Herbarium, and I come here upon an instance of species-making, which fortunately is rather uncommon. Certainly the three specimens are not quite identical, that of *P. platylobum* being bipinnatifid with entire segments while the two others are bipinnate below with lobed segments, but the former specimen is only a smaller leaf of the same species of which the other two are a more developed state; there is not the slightest difference to find between the specimens as

to texture, colour, pubescence and other characters. The type-specimen of *P. tarapotense* and that referred to *P. biserialis* are fully identical or rather they belong to the same specimen; *P. tarapotense* was described from the upper half of a single leaf, of which the lower part with the stipe 7 years before was described as *P. biserialis*. The explanation of this BAKER's making a third species on the same collector-number is however quite clear; on the sheet with the upper part of a leaf described as *P. tarapotense* is affixed the lower part of a stipe with "large brown lanceolate scales with a sudden grey edge" (BAKER, l. c. 505). This stipe belongs to a species of *Alsophila* or *Cyathea*!

D. platyloba is a distinct species closely allied to *D. subincisa* but less cut. It agrees with different forms of that collective species by the upper pinnæ being broadly adnate to rachis with the lower basal segment decurrent, in the larger pinnate-pinnatifid pinnæ the basal posterior lobe is similarly adnate and decurrent on the costa. — Stipe 40–50 cm long, trisulcate above, densely clothed below with 1–1½ cm long, glossy, dark-brown, rigid, toothed, linear-lanceolate scales, upwards like rachis fibrillose by similar but smaller scales and rather densely pubescent by subulate, articulated hairs. Lamina up to 1 m long, lanceolate, grey-green or brownish-green when dry, paler beneath, thickly membranous. Pinnæ up to 20 cm long, 2½–4 cm broad, long-acuminate, the lower ones short-stalked, the upper adnate to rachis. Costæ and costulæ above setose by antrorse, subulate, articulated hairs, upperside otherwise glabrous; costæ rather hairy by patent hairs, which are partly short and unicellular, partly longer and pluricellular, subulate, leaf-tissue of underside very minutely and sparsely pubescent; scales of costæ very few, hairlike, brown. Most pinnæ pinnatifid only, still in large specimens fully pinnate at base, those of the basal pair with the basiscop side enlarged. Segments or pinnules 6–10 mm broad, obtuse, entire or deeply lobed, the posterior basal lobe decurrent and adnate to costa. Veins once forked in the entire segments, pinnate in the tertiary lobes not reaching the margin. Sori small, exindusiate, nearer the edge than the midrib, generally on the middle of the anterior branch of the forked vein, or near the apex of the simple veins of the tertiary lobes, 2–3 to each lobe.

52. *Dryopteris biserialis* (Bak.) C. Chr. Index 254. 1905.

Syn. *Polypodium biserialis* Bak. Syn. 309. 1867, pro parte.

Nephrodium subglabrum Sodiro, Cr. vasc. quit. 259. 1893.

Dryopteris subglabra C. Chr. Ind. 295. 1905.

Type from Ecuador, Mt. Tunguragua, SPRUCE sine num. (Kew!); prope San Nicolas, SODIRO (C).

As stated above the Peruvian specimen (SPRUCE 4656) referred to *P. biserialis* by BAKER belongs to the preceding species. I regard here the two other specimens which in Kew are referred to *P. biserialis* by BAKER as the type-specimens of a species, for which I use BAKER's name. It is a species closely allied to *P. platyloba*;

it differs a little in pubescence, the costæ beneath being furnished with some scattered, articulated hairs only, and especially by the position of the sori, which are placed near the base of the branches of the forked vein and nearer the costa and the margin. Generally both branches are soriferous and the sori therefore are in pairs, from which character BAKER took his specific name. The species is somewhat smaller than the preceding but fully tripinnatifid; in colour, texture, the adnate and decurrent segments and upper pinnæ the two species fully agree.

D. grandis (Pr.) subsp. *macroptera* (Klf.) (see Ind. Fil. 269) is a species of the same relationship as the two preceding ones; it is often bipinnatifid only but can be much larger, bipinnate with deeply lobed pinnules. It differs from the species mentioned by its glabrous rachis and costæ. It is common in South Brazil.

Species of uncertain position.

53. *Dryopteris hirsuto-setosa* Hieron. Hedwigia 46: 343 tab. 6 fig. 16. 1907.

Type from Ecuador: Baños-Pintuc, STÜBEL nr. 903 (B1).

A bipinnatifid species excellently described and figured by HIERONYMUS and I have nothing to add. It is certainly related to some of the sub-species referred to *D. subincisa* (Ind. Fil. 295), especially *Polypodium Blanchetianum* Kze. and *P. Karstenianum* Kl., with which "subspecies" it agrees in pubescence. As the two sub-species mentioned certainly are closely allied to the true *D. subincisa*, which can be regarded as the typical species of a proper group to which *D. platyloba* and *D. biserialis* also belong, it is very likely that *D. hirsuto-setosa* belongs to the same group. It differs from all the species in this paper referred to *Ctenitis* by its pubescence; the whole leaf is densely pilose by very long, soft, flexible, pluricellular hairs but apparently without scales.

The Brazilian *D. hirtula* (Kze.) C. Chr. is clothed with very similar hairs and is another species of a very doubtful systematic position. It is fully tripinnatifid and, therefore, excluded from the present monograph.

Unknown species of § *Ctenitis*.

1. *Phegopteris Blanchetiana* Fée, Gen. 245. 1850—52 — Bahia, BLANCHET nr. 2928.
2. *Aspidium obtusilobum* Fée, 8 mém. 105. 1857; *Dryopteris huatuscensis* C. Chr. Ind. 271. 1905. — Mexico, Huatusco, SCHAFFNER nr. 105.
This is perhaps a form of *D. submarginalis*.
3. *Phegopteris fluminensis* Fée, Cr. vasc. Br. 1: 97. 1869 — Rio de Janeiro, GLAZIOU nr. 965. — In Ind. Fil. referred to *D. deflexa*, but judging from the description it can be every other species.
4. *Aspidium nervalum* Fée, Cr. vasc. Br. 1: 136. 169. — Brazil, Serra os Orgaos, GLAZIOU nr. 1764. — In Ind. Fil. referred to *D. submarginalis*, it is perhaps the same as *D. pedicellata*.

Subgenus 4. *Lastrea* Bory, emend. C. Chr.

Biologiske Arbejder tilegnede Eug. Warming p. 79. 1911.

This subgenus is nearly identical with the group of *Dryopteris opposita* monographically dealt with in my former papers on American species of *Dryopteris* (quoted above pag. 55). I have there in some details mentioned the characters of the group, and I have only a little to add to my earlier treatment. Still my delimitation of the group must be somewhat changed, partly by including some species, which have not a decrescent lamina, partly by excluding some few species, which I now refer to the subgenus *Glaphyopteris*.

The character: a *lamina decrescens* is, like all other single characters, not available as standard-character, which all species of this subgenus have in common and which is found only here. It is evident that a species as *D. blanda* (Fée) C. Chr. is a near relative of *D. oligocarpa*, although it has not the lamina narrowed downwards. Our common *D. thelypteris* is another instance of a species having a non-attenuate leaf. Still such species are exceptions which affirm the rule. Out of the 118 species enumerated below only 3 or 4 have not auriculiform pinnæ. On the other hand species with a *lamina decrescens* are to be found also within other subgenera, f. inst. *Glaphyopteris* and *Steiropteris*. In some species of § *Cyclosorus*, f. inst. the typical *D. mollis*, the lamina is so much narrowed downwards as in most species of § *Lastrea*, and the same can be said on *D. Saffordii* a species of § *Eudryopteris*.

The best and most constant character of § *Lastrea* is the venation, as explained in my "Revision". The veins are always free, as a rule simple (in some few species normally furcate), the basal ones nearly always reaching the margins above sinus and not separated by a cartilagineous membrane as in species of § *Steiropteris* and *Cyclosorus*. The frequent occurrence of sessile glands on the leaf-tissue beneath and of aërophores at the base of the pinnæ are also characteristic for the subgenus. In this paper I have excluded those species having aërophores at the base of the segments and referred them to § *Glaphyopteris*, viz. *D. Cañadazii*, *D. Thomsonii* and *D. macradenia*. Most species are rather hairy by simple and, as a rule, unicellular hairs; only in some very long-hairy species (*D. mertensioides*, *D. Ruiziana*, *D. nitens*, *D. multiformis* and some others) the long hairs consist of 2—4 cells, but such hairs are not very like the short, pluricellular hairs so characteristic in species of § *Ctenitis*. The sori are in several species exindusiate, in others furnished with a small, rarely persistent indusium.

Since the publication of my earlier papers I have examined numerous specimens of species belonging to § *Lastrea*, some of which belong to species previously unknown to me and some others to species new to science. In the following pages I give another supplement to my first paper, and the number of species is now increased to 120. As seen from that number the subgenus is extraordinarily

rich in species occurring in tropical America; each new collection received contains new forms. As the key in my "Revision" includes 82 species only I have worked out an entirely new key including all the species known to me. After the key follows a systematical enumeration of all species including descriptions of several new species or of species not seen, as I worked out my "Revision". As will be seen the order of the species is not exactly the same as in "Revision, and further that I have not arranged the species in sections and subsections. I think that my present arrangement is a natural one in that sense that species intimately related to each other are placed side by side. It is possible to separate out smaller groups of closely related species, but such groups are connected with other groups by several intermediate species that a thorough grouping of all the species should be very defective. As rather distinct small groups I shall here mention

1°) the group of *D. rudis*, which includes the species 151—160 and probably others. They are large-grown species with generally dark-green, coriaceous or papyraceous, more or less hairy but always eglandulose lamina, which downwards is suddenly narrowed, the lower 3-5 pinnæ being fully abortive and like small warts along the stipe; the basal segments of the lower pinnæ are similarly reduced; aërophore present; sori exindusiate. In most species the rhizome seems to be creeping. This group appears to be a most distinct one, its species being widely different from those allied to *D. oligocarpa* and *D. opposita*. Still the difference between these and such species as *D. Sprengelii* and *D. Christensenii* is only small and these species again are closely allied to *D. panamensis*, *D. pachyrachis*, *D. tabraziensis* and others, which no doubt are intimately related to *D. opposita* and *D. oligocarpa*. On the other hand *D. rudis* and its relatives are connected with the large bipinnate species *D. pteroides* by a species as *D. euchlora*, and it is perhaps unnatural to place species as *D. Thomsonii*, *D. macradenia* in another subgenus, *Glaphyopteris*, as they are as to essential characters very near *D. rudis*.

2°) the group of *D. cheilanthoides*, including the species nr. 165—170. Large species of thick texture and numerous veins; glanduliform pinnæ as in the former group and aërophore as a rule present. Rhizome erect; hairs long, soft, pluricellular; underside often glandulose and viscid; basal segments of most species not much reduced, the lower one often prolonged; sori often indusiate. Species of a characteristic texture and colour, which I can not explain. This group is through *D. limbata* and *D. consanguinea* connected with *D. opposita* and *D. sancta*.

3°) The group of *D. rivularioides*, including the species nr. 132—137, characterized by a long-creeping rhizome and occasionally furcate veins. All the species are from South-Brazil and adjacent countries.

4°) The group of *D. sancta*, including the species nr. 56—62, small species of thin texture and often with unequal-sided pinnæ.

Key.

1. Tertiary veins 1—10-jugate. Lamina towards the base gradually, rarely abruptly attenuate, or, in some few species, not at all narrowed downwards.
2. Rhizome erect or decumbent with the stipites fasciculated. Veins nearly always simple.
3. Pinnæ rarely more than 1½ cm broad, 10 cm long.
4. Lamina towards the base very gradually narrowed; reduced pinnæ numerous, stipe very short (type II). Basal segments, especially the upper one, generally longer and often broader than the others. Most species small.
5. Pinnæ entire or subentire, ½—1½ cm long.
 6. Pinnæ short-stalked, about 1 cm long; rachis without scales 54. *D. pusilla* (Mett.) O. Ktze.
 6. Pinnæ sessile, 1½ cm long; rachis scaly
 55. *D. brachypoda* (Bak.) C. Chr.
5. Pinnæ deeply lobed, or, as a rule, pinnatifid.
 6. Rachis scaly.
 7. Pinnæ scarcely 2 cm long, auricled on both sides of the base, subentire or subpinnatifid; stipe nearly none
 55. *D. brachypoda* (Bak.) C. Chr.
 7. Pinnæ 3—4 cm long, regularly pinnatifid; stipe 3—4 cm long 102. *D. Funckii* (Mett.) O. Ktze.
 6. Rachis without scales.
 7. Veins not prominent above; lamina herbaceous or thinly membranous.
 8. Pinnæ unequal-sided, the anterior (upper) side being broader than the posterior one.
 9. Rhizome small, erect. Pinnæ pinnatifid, generally glandulose beneath.
 10. Indusium absent or minute. 56. *D. sancta* (L.) O. Ktze.
 10. Indusium large, persistent.
 11. Lamina herbaceous; sori about medial; reduced pinnæ few 57. *D. sanctiformis* n. sp.
 11. Lamina membranous to coriaceous; sori close to the margin 59. *D. consanguinea* (Fée) C. Chr.
 9. Stem epigæous, very long and scaly; pinnæ with a straight, cuneate, entire base on the lower side, not deeply cut, eglandulose 58. *D. longicaulis* (Bak.) C. Chr.
8. Pinnæ equal-sided, but sometimes auricled at the upper base only.
 9. Leaf thinly herbaceous. Small species with pinnæ 2—3 cm long; veins 2—3-jugate.
 10. Segments entire, the margins not revolute.
 11. Sori supramedial; lamina scarcely 30 cm long 60. *D. delicatula* (Fée) C. Chr.
 11. Sori medial; lamina up to 50 cm long
 61. *D. pseudosanta* C. Chr.
 10. Segments crenate with revolute margins
 62. *D. physematioides* (Kuhn et Christ) C. Chr.
9. Leaf firmly herbaceous or membranous. Most species larger with pinnæ 3—10 cm. long.

10. Segments short, obtuse; veins 3—7 to a side.
11. Pinnæ obtuse 65. *D. coarctata* (Kze.) C. Chr.
11. Pinnæ acuminate.
12. Lamina glabrous or hairy on the rachis and costæ only.
13. Sori medial. Under surface slightly or not glandular 64. *D. riopardensis* Ros.
13. Sori near the margin. Under surface densely glandulose.
14. Pinnæ close; segments entire, the basal ones not auricled
63. *D. opposita* (Vahl) Urb.
14. Pinnæ distant; segments toothed at the apex, the basal ones with an interne auricle
59. *D. consanguinea* var. *aequalis* C. Chr.
12. Lamina more or less hairy on the surfaces.
13. Under surface glandular. Pinnæ auricled at the upper base
65. *D. coarctata* (Kze.) C. Chr.
13. Under surface not glandular. Pinnæ not auricled, shortly pubescent throughout; indusium very pilose
66. *D. leucothrix* C. Chr.
10. Segments long, linear, falcate or very oblique; veins 7—9-jugate.
11. Lamina downwards gradually narrowed.
12. Under surface glandular
67. *D. panamensis* (Pr.) C. Chr.
12. Under surface not glandular
144. *D. scalaris* (Christ) C. Chr.
11. Lamina downwards abruptly narrowed, eglandulose 68. *D. silviensis* Hieron.
7. Veins prominent above, occasionally furcate. Lamina chartaceous or coriaceous.
8. Lamina chartaceous or membranous, nearly glabrous; pinnæ as a rule unequal-sided 59. *D. consanguinea* (Fée) C. Chr.
8. Lamina coriaceous, hairy on the ribs; pinnæ scarcely unequal-sided 69. *D. sculpturoides* (Fée) C. Chr.
4. Lamina towards the base shortly attenuate with 1—4 pairs of reduced pinnæ (type I), or, in some species, without auriculi-form pinnæ. Basal segments equal or shorter than the others, seldom a little longer. Middle-sized species.
5. All pinnæ sessile. Sori round.
6. Rachis (and costæ beneath) without scales, at least the scales are very few and deciduous.
7. Sporangia setose. Indusium absent or rarely found.
8. Rachis and costæ beneath densely pulverulent by very short hairs, long hairs absent
70. *D. concinna* (Willd.) O. Ktze.
8. Rachis and costæ beneath sparsely pubescent by longer hairs.

9. Andine species. Pinnæ opposite, firm; veins about 8-jugate 71. *D. rufa* (Poir.) C. Chr.
9. South Brazilian species. Pinnæ alternate, herbaceous; veins about 5-jugate 72. *D. Stierii* (Ros.) C. Chr.
7. Sporangia glabrous.
8. Lamina herbaceous or membranous.
9. Rachis subglabrous or more or less pubescent by long hairs, not densely pulverulent by very short hairs.
10. Lower pinnæ not or a little reduced, not auriculiform.
11. Pinnæ 3—4 cm long; rachis and costæ on both sides pubescent. Indusium none
73. *D. blanda* (Fée) C. Chr.
11. Pinnæ 6—7 cm; rachis and costæ beneath glabrous. Indusium present
74. *D. tablana* (Christ) C. Chr.
10. 1—5 pairs of lower pinnæ much reduced, auriculiform or glanduliform.
11. Stipe at base with many long, brown, squarrose scales.
12. Pinnæ about 6 cm long, rigidly membranous or papyraceous.
13. Reduced pinnæ few (1—2 pairs).
Veins above with long setæ
75. *D. Rimbachii* Ros.
13. Reduced pinnæ in 4—5 pairs. Veins above without long setæ.
14. Lower pinnæ gradually reduced. Upperside hairy, not glossy
76. *D. brachypus* (Sod.) C. Chr.
14. Lower pinnæ suddenly reduced.
Upperside glabrous, glossy
77. *D. supranitens* Christ.
12. Pinnæ about 12 cm long, not glossy above, thinly membranous
78. *D. tablaziensis* Christ.
11. Stipe at base with a few scattered, short scales or scaleless.
12. Hairs of rachis beneath none or few, early deciduous.
13. Pinnæ unequal-sided, the anterior (upper) side being broader than the posterior one.
14. Pinnæ not deeply cut with a straight, entire, cuneate base on the lower side. Underside eglandulose. Veins 1—3-jugate
58. *D. longicaulis* (Bak.) C. Chr.
14. Pinnæ regularly pinnatifid on both sides. Underside glandulose. Veins 3—4-jugate
57. *D. sanctiformis* n. sp.

13. Pinnæ equal-sided.
14. Lamina thinly herbaceous. Segments broad, very oblique.
15. A distinct tuberculiform aërophore at the base of the pinnæ beneath. Sori infra-medial. Guadeloupe
81. *D. hydrophila* (Fée) C. Chr.
15. No distinct aërophore. Sori supramedial. Argentina
82. *D. Lorentzii* (Hieron.) C. Chr.
14. Lamina firmly herbaceous-membranaceous. Segments not very oblique.
15. Veins 4–6-jugate; rachis and surfaces almost quite glabrous.
16. A single pair of auriculi-form pinnæ
74. *D. tablana* (Christ) C. Chr.
16. 3–4 pairs of auriculi-form, often tripartite pinnæ . . . 79. *D. Lindigii* C. Chr.
15. Veins 8–10-jugate.
16. Lamina downwards abruptly narrowed, chartaceous, sparsely hairy beneath on costæ and costulæ only
80. *D. lustrata* (Hieron.) C. Chr.
16. Lamina downwards gradually narrowed, firmly herbaceous or membranous.
17. Indusium persistent, very setose. Rachis glabrous
109. *D. palustris* (Mett.) O. Ktze.
17. Indusium small, deciduous. Rachis sparsely hairy.
18. Veins indistinct. Lamina firmly membranous, the underside nearly glabrous throughout, the upperside sparsely pubescent
110. *D. Hieronymusii* C. Chr.

18. Veins distinct.
Lamina firmly membranous, the underside sparsely pubescent, the upperside subglabrous
83. *D. argentina* (Hieron.) C. Chr.
12. Hairs of rachis beneath persistent, often many and sometimes pluricellular.
13. Indusium none or very small, rarely seen.
14. Rhizome erect or obliquely erect.
15. Hairs of rachis long, patent, often pluricellular.
16. Stipe more or less hairy, not clothed with a dense mass of woolly hairs.
17. Lamina herbaceous; basal segments without auricles
84. *D. oligocarpa* (H. B. W.) O. Ktze.
17. Lamina thickly membranous; basal segments with an interne auricle
170. *D. multiformis* n. sp.
16. Stipe and lower part of rachis very densely hairy by woolly, patent, long hairs . . . 166. *D. lanipes* C. Chr.
15. Hairs of rachis short, mostly adpressed, unicellular. Andine species.
16. Veins 7—8 to a side in the slightly oblique segments. . . 86. *D. rivulariformis* Ros.
16. Veins 10—11 to a side in the falcate-ligulate segments
112. *D. utañagensis* Hieron.
14. Rhizome decumbent or short-creeping. South Brazil
87. *D. Regnelliana* C. Chr.
13. Indusium persistent.
14. Rachis densely pilose by long, patent hairs
85. *D. pilosula* (Kl. et Karst.) Hieron.
14. Rachis short-hairy.
15. Indusium black. Guatemala
118. *D. melanochlaena* C. Chr.
15. Indusium pale. Rhizome short-creeping.

16. Leaf-tissue of both sides glabrous. Indusium glabrous 88. *D. rioverdensis* C. Chr.
16. Leaf-tissue of both sides finely pubescent. Indusium setose
86. *D. rivulariformis* Ros.
9. Rachis densely pulverulent by very short hairs, long hairs being absent or few among the short ones.
10. Lamina towards base gradually and shortly attenuate. West-Indian and Andine species.
11. Indusium persistent, densely setose. Underside densely glandular. Jamaica
89. *D. Nockiana* (Jenm.) C. Chr.
11. Indusium none or small. Underside not or sparsely glandular.
12. Leaf throughout hairy by rather rigid hairs.
13. Veins above without solitary, long setæ..... 90. *D. muzensis* Hieron.
13. Veins above with solitary, long setæ 91. *D. columbiana* C. Chr.
12. Leaf glabrous or very inconspicuously hairy between the veins.
13. Hairs of costæ and veins minute; underside slightly glandulose. Sori supramedial with a glandulose indusium. Cuba 92. *D. piedrensis* C. Chr.
13. Hairs of costæ and veins rather long, rigid; underside eglandulose. Sori medial, exindusiate. Andes
93. *D. boqueronensis* Hieron.
10. Lamina towards base abruptly attenuate.
11. Andine species 94. *D. lepidula* Hieron.
11. Brazilian species 95. *D. Lindmani* C. Chr.
8. Lamina coriaceous or rigidly papyraceous.
9. Stipe and rachis glossy, atropurpureous.
10. Costæ beneath glabrous. 96. *D. laevigata* (Mett.) C. Chr.
10. Costæ beneath strigose.... 97. *D. Crossii* (Bak.) C. Chr.
9. Stipe and rachis stramineous or greyish.
10. Pinnæ scarcely 2½ cm long, often subentire; veins 2—4-jugate. Stipe much longer than the lamina..... 99. *D. Millei* n. sp.
10. Pinnæ 4—10 cm long, deeply pinnatifid; veins 4—10-jugate. Stipe as a rule shorter than the lamina.
11. Rachis densely pulverulent by very short hairs, without long hairs.. 92. *D. piedrensis* C. Chr.
11. Rachis subglabrous or more or less hairy by longer hairs.
12. Lamina with a rounded base, the lower 1—2 pairs of pinnæ being auriciform and rather closely placed.

13. Stipe at base with many long, brown scales 75. *D. Rimbachii* Ros.
13. Stipe at base with a few scattered short scales.
14. Rachis and costæ beneath shortly setose 130. *D. Pavoniana* (Kl.) C. Chr.
14. Rachis and costæ villous by long, pluricellular hairs
170. *D. multiformis* n. sp.
12. Several pairs of distant gradually or abruptly reduced pinnæ.
13. Stipe very densely clothed with woolly hairs 166. *D. lanipes* C. Chr.
13. Stipe glabrous or sparsely pubescent.
14. Lamina gradually narrowed downwards
98. *D. Galanderi* (Hieron.) C. Chr.
14. Lamina abruptly narrowed
80. *D. lustrata* (Hieron.) C. Chr.
6. Rachis (and costæ beneath) more or less scaly.
7. Scales rather few, small and narrow-subulate, brown.
8. Whole leaf throughout hairy by short pseudo-stellate hairs, i. e. the hairs are often found in bundles of 2–5 originating from the same epidermal cell
100. *D. phacelothrix* C. Chr. et Ros. n. sp.
8. Leaf with ordinary simple hairs.
9. Lamina coriaceous. Segments broadly triangular
101. *D. caucaensis* (Hieron.) C. Chr.
9. Lamina firmly herbaceous. Segments oblong
102. *D. Funckii* (Mett.) O. Ktze.
7. Scales of rachis very numerous, broad, yellowish, glandulose 103. *D. velata* (Kze.) O. Ktze.
5. Lower pinnæ petiolulate.
6. Pinnæ entire or subentire, $\frac{1}{2}$ – $1\frac{1}{2}$ cm long. Indusium persistent, densely setose 54. *D. pusilla* (Mett.) O. Ktze.
6. Pinnæ 2– cm long, deeply lobed or pinnatifid. Indusium absent or minute.
7. Pinnæ with a truncate base. Sori oblong-linear
104. *D. aspidioides* (Willd.) C. Chr.
7. Pinnæ with a cuneate base. Sori oblong-linear or round
105. *D. ptarmica* (Kze.) O. Ktze.
3. Pinnæ 2–5 cm broad, 10–15 cm long, the lower 3–5 pairs as a rule reduced (type III). Most species large.
4. Sori all round.
5. Rachis without scales. Segments rarely 5 mm broad.
6. Leaf-tissue glabrous, at least not densely pubescent by adpressed hairs.
7. Lamina papyraceous or membranous.
8. Pinnæ pinnatifid only; most segments entire.
9. Rachis glabrous beneath or deciduously hairy.
10. Lamina beneath with large, red glands. Sori medial, indusium large, glandulose.
106. *D. pachyrachis* (Kze.) O. Ktze.

10. Lamina eglandulose.
11. Costæ beneath without scales.
 12. Indusium very large, persistent; sori medial. 106. *D. pachyrachis* (Kze.) O. Ktze.
 12. Indusium small or none.
 13. Sori medial, exindusiate 146. *D. Bradei* Christ.
 13. Sori supramedial or submarginal.
 14. Indusium present; pinnæ about 1½ cm broad; veins above sparsely setose 110. *D. Hieronymusii* C. Chr.
 14. Indusium none; pinnæ 2 cm broad; veins above glabrous 111. *D. roraimensis* (Bak.) C. Chr.
 11. Costæ beneath with scattered, brown scales.
 12. Segments with open spaces between; indusium very large, persistent, glandular 106. *D. pachyrachis* var. *Sprucei* (Bak.) C. Chr.
 12. Segments close, acute; indusium smaller, not glandular 113. *D. illicita* Christ.
9. Rachis rather pubescent. Underside eglandulose.
10. Sori medial. Lamina papyraceous or subcoriaceous.
 11. Segments 2 mm broad, falcate-ligulate 112. *D. utañagensis* Hieron.
 11. Segments 3—4 mm broad, patent.
 12. Basal segments parallel to rachis 106. *D. pachyrachis* (Kze.) O. Ktze.
 12. Basal segments (of larger pinnæ) overlapping the rachis or with interne auricles.
 13. Rachis short-hairy; costæ beneath without scales; indusium persistent 107. *D. supina* (Sod.) C. Chr.
 13. Rachis long-hairy; costæ beneath somewhat scaly; indusium none 170. *D. multiformis* n. sp.
 10. Sori near the margin. Lamina firmly membranous.
 11. Lamina gradually narrowed downwards with 2—3 pairs of auriculiform pinnæ. Veins 8—9-jugate 120. *D. demerarana* (Bak.) C. Chr.
 11. Lamina abruptly attenuate with several pairs of glanduliform pinnæ. Veins 10—14-jugate 148. *D. Christensenii* Christ.
8. Pinnæ with the lower segments free; segments crenate 114. *D. atropurpurea* Hieron.
7. Lamina thinly herbaceous.
8. Costæ beneath glabrous or sparsely pubescent by unicellular hairs, without scales.
 9. Sori medial. Rachis glabrous or nearly so; under surface generally glandulose.
 10. Indusium glabrous, glandulose.
 11. Jamaica . . . 106. *D. pachyrachis* var. *Jenmani* (Bak.)

11. South Brazil 108. *D. tenerrima* (Fée) Ros.
 10. Indusium densely setose 109. *D. palustris* (Mett.) O. Ktze.
 9. Sori supramedial. Rachis pubescent.
 10. Stipe and rachis strong. Basal segments enlarged 63. *D. opposita* var. *amphioxypteris* (Sod.) C. Chr.
 10. Stipe and rachis very slender. Basal segments equal 115. *D. recumbens* Ros.
 8. Costæ beneath densely soft-hairy by long, patent, pluricellular hairs and sparsely scaly
 123. *D. nitens* (Desv.) C. Chr.
6. Leaf-tissue, especially above, densely and finely puberulous by adpressed hairs.
 7. West-Indian species. Indusium small, setose or absent.
 8. Segments 3—5 mm broad, both surfaces densely downy. Stipe and rachis slender, not scaly
 116. *D. rustica* (Fée) C. Chr.
 8. Segments 5—7 mm broad, underside subglabrous. Stipe strong, scaly 117. *D. Germaniana* (Fée) C. Chr.
7. Continental species.
 8. Indusium persistent.
 9. Indusium black, slightly ciliate. Segments entire; veins 7—10 118. *D. melanochlaena* C. Chr.
 9. Indusium pale, setose. Segments toothed upwards. Veins 10—11 119. *D. atrorubens* (Mett.) C. Chr.
 8. Indusium absent.
 9. Sori near the margin. Lower pinnæ auriculiform
 120. *D. demerarana* (Bak.) C. Chr.
 9. Sori about medial. Lowermost pinnæ glanduliform 147. *D. Rusbyi* C. Chr.
5. Rachis more or less scaly. Segments often 5—7 mm broad.
 6. Pinnæ incised two-thirds of the way down to the costa only, glabrous 122. *D. Moritziana* Urban.
6. Pinnæ incised to a narrow wing to the costa.
 7. Lamina (costæ above excepted) glabrous. Basal segments enlarged 113. *D. illicita* Christ.
 7. Lamina pubescent, at least on the costæ and costulæ beneath. Basal segments not enlarged.
 8. Sori medial or inframedial.
 9. Lamina firmly herbaceous to chartaceous. Costæ beneath strigose or hairy by patent, rather stiff, unicellular hairs.
 10. Leaf-tissue glabrous. Sori exindusiate 147. *D. Bradei* Christ.
 10. Leaf-tissue finely pubescent. Costæ beneath patently hairy 121. *D. dominicensis* C. Chr.
 9. Lamina very thin; costæ beneath and margins with numerous soft, patent, pluricellular hairs
 123. *D. nitens* (Desv.) C. Chr.
8. Sori supramedial. Leaf-tissue finely pubescent above.
 9. Rachis very sparsely scaly. Pinnæ distant, the lower 2—3 pairs reduced. Veins 7—9.
 120. *D. demerarana* (Bak.) C. Chr.
 9. Rachis very scaly. Pinnæ closer, about 10 pairs reduced. Veins 10—15. 150. *D. corazonensis* (Sod.) C. Chr.

4. Basal sori oblong or linear, the upper ones roundish, oblong or linear.
5. Lamina gradually narrowed downwards.
 6. Basal veins running to the sinus. Reduced pinnæ few. Veins 6–7-jugate 124. *D. diplazioides* (Desv.) Urban.
 6. Basal veins running to the margin above sinus. Reduced pinnæ several. Veins 10–15-jugate.
 7. Veins immersed, 10–12-jugate. Leaf throughout shortly pubescent, 50–60 cm long. Sori medial, oblong-linear 125. *D. consimilis* (Fée) C. Chr.
 7. Veins raised above, 10–15-jugate. Leaf sparsely pubescent by longer hairs, 80–100 cm long. Sori supra-medial, roundish or oblong... 126. *D. heteroclita* (Desv.) C. Chr.
5. Lamina downwards abruptly narrowed.
 6. Lamina finely puberulous throughout. Sori exindusiate 127. *D. atrovirens* C. Chr.
 6. Lamina glabrous between the veins. Indusium small. 128. *D. leptogrammoides* Ros.
2. Rhizome wide-creeping with distant stipites. Veins not rarely furcate.
 3. Lamina coriaceous. Reduced pinnæ none or 1–2-jugate.
 4. Sporangia setose. Jamaica 129. *D. firma* (Jenm.) C. Chr.
 4. Sporangia glabrous. Andes 130. *D. Pavoniana* (Kl.) C. Chr.
 3. Lamina herbaceous or membranous. Sporangia glabrous.
 4. Lower 3–8 pairs of pinnæ reduced.
 5. Rachis and costæ beneath sparsely scaly. Andine species 131. *D. Rosenstockii* C. Chr.
 5. Rachis and costæ without scales. South-Brazilian species.
 6. Leaf-tissue glabrous.
 7. Pinnæ up to 8 cm long, scarcely narrowed towards their base 132. *D. Santa Catharinae* Ros.
 7. Pinnæ up to 18 cm long; narrowed gradually towards their base 133. *D. Jürgensii* (Ros.) C. Chr.
 6. Leaf-tissue beneath pubescent.
 7. Lamina abruptly narrowed downwards.. 134. *D. Mosenii* C. Chr.
 7. Lamina gradually narrowed downwards.
 8. Pinnæ deltoideo-oblong. Veins often furcate 135. *D. rivularioides* (Fée) C. Chr.
 8. Pinnæ linear-lanceolate. Veins simple .. 136. *D. scariosa* Ros.
 4. Lower pinnæ not reduced at least not auriculiform. Most veins furcate. Lower segments of larger pinnæ quite free. Veins simple 137. *D. tremula* Christ.
 1. Veins 12–25-jugate, generally close.
 2. Lamina bipinnatifid; no segments free.
 3. Sporangia glabrous.
 4. Argentine and South-Brazilian species.
 5. Aërophore none. Rhizome creeping. Costæ more or less pilose.
 6. Veins 14–16-jugate, pellucid. Lamina thinly herbaceous 138. *D. siambonensis* (Hieron.) C. Chr.
 6. Veins 16–18-jugate. Lamina firm 139. *D. achalensis* (Hieron.) C. Chr.
 5. Aërophore present. Rhizome erect. Lamina with some few scattered long hairs or perfectly glabrous.

6. Margins of segments revolute covering the sori. Lamina coriaceous, glandular beneath. Veins simple. Lower basal segments prolonged 169. *D. cheilanthoides* (Kze.) C. Chr.
6. Margins plane. Lamina membranous, eglandulose. Veins often furcate. Lower basal segments not prolonged 162. *D. Glaziovii* (Christ.) C. Chr.
4. West Indian and Andine species.
5. Lamina herbaceous or membranous; margins plane or slightly revolute.
6. Rachis not or very slightly scaly.
7. Segments entire or inconspicuously toothed, the basal ones without auricles.
8. Rachis glabrous or with few, deciduous hairs.
9. Lamina glandulose beneath 140. *D. Sprengelii* (Klf.) O. Ktze.
9. Lamina eglandulose.
10. Segments 2—4 mm broad. Leaf-tissue of both sides minutely puberulous. Sori close to the edge. Veins 10—15-jugate.
11. 3—4 pairs of lower pinnæ auriculiform. Segments very close entire 141. *D. struthiopteroides* C. Chr.
11. 3—4 pairs of lower pinnæ glanduliform. Segments not close, often serrate. 143. *D. conformis* (Sod.) C. Chr.
10. Segments 5—7 mm broad. Leaf entirely glabrous; costæ beneath with some scattered light-brown scales. 161. *D. euchlora* (Sod.) C. Chr.
8. Rachis and costæ more or less pilose.
9. Sori indusiate. Lamina glandulose beneath 142. *D. Mercurii* (A. Br.) Hieron.
9. Sori exindusiate, or indusium very small. Lamina eglandulose.
10. Lower pinnæ very gradually reduced.
11. Sori oblong or linear see nr. 125. *D. consimilis* and nr. 126. *D. heteroclita*.
11. Sori round. 144. *D. scalaris* (Christ.) C. Chr.
10. Lower pinnæ abruptly reduced, the lowermost glanduliform.
11. Leaf-tissue of upperside glabrous.
12. Sori medial. Rachis with some few scales. 146. *D. Bradei* Christ.
12. Sori supramedial. Rachis densely ochraceo-tomentose without scales 154. *D. rudis* (Kze.) C. Chr.
11. Leaf-tissue of upperside finely pubescent.
12. Sori medial. Costæ on both sides setose. Bolivia. 147. *D. Rusbyi* C. Chr.
12. Sori near the margin. Rachis and costæ beneath very shortly and densely pulverulent 148. *D. Christensenii* Christ.
7. Segments crenate or more or less lobed.
8. Basal segments with an interne auricle which overlaps the rachis.

9. Sori close to the margin. West-Indian species
149. *D. limbata* (Kze.) O. Ktze.
9. Sori about medial. Ecuador 170. *D. multiformis* n. sp.
8. Basal segments without interne auricle.
9. Lamina rather gradually reduced downwards
140. *D. Sprengelii* var. *Sherringii* (Jenm.).
9. Lamina abruptly reduced, the lowermost pinnæ glanduliform.
10. Both surfaces finely pubescent. Segments 2—4 mm broad 143. *D. conformis* (Sod.) C. Chr.
10. Lamina quite glabrous. Segments 5—7 mm broad 161. *D. euchlora* (Sod.) C. Chr.
6. Rachis rather scaly. Lamina suddenly with 5—8 pairs of auriculiform pinnæ 150. *D. corazonensis* (Sod.) C. Chr.
5. Lamina coriaceous or chartaceous with the margins more or less revolute, downwards abruptly narrowed with 2—5 pairs of distant, glanduliform pinnæ. Costæ beneath often with some few scales.
6. The revolute margins not covering the sori. Basal segments of larger pinnæ generally much reduced.
7. Costæ beneath glabrous or more or less pilose by short, unicellular hairs.
8. Lamina quite glabrous 151. *D. semilunata* (Sod.) C. Chr.
8. Lamina (at least rachis) more or less pilose.
9. Pinnæ about 5 cm long with very oblique segments 152. *D. canelensis* Ros.
9. Pinnæ 10—20 cm long, the segments often falcate but not very oblique.
10. Costæ beneath setose by more or less antrorse stiff hairs and generally furnished with scattered small, brown scales. Indusium none.
11. Sori medial. Largest pinnæ scarcely 12 cm long. Lamina (costa excepted) subglabrous
153. *D. nervosa* (Kl.) C. Chr.
11. Sori supramedial. Largest pinnæ 15—20 cm long. Lamina, especially beneath, setose.
12. Segments rather close with acute sinuses between 154. *D. rudis* (Kze.) C. Chr.
12. Segments patent separated by broad open sinuses 155. *D. Engelii* Hieron.
10. Costæ beneath pilose by patent hairs.
11. Largest pinnæ 10—18 cm long, horizontal or ascendent, sparsely strigose beneath on costæ and costulæ only. Receptacle glabrous. Segments close, oblique or sub-falcate.
12. Basal segments without auricle.
13. Veins 11—12-jugate. Segments obtuse 158. *D. strigifera* Hieron.
13. Veins 14—15-jugate. Segments acute 159. *D. Brausei* Hieron.
12. Basal segments with an interne auricle
170. *D. multiformis* n. sp.

11. Largest pinnæ up to 30 cm long, often pendent, rather densely hairy by shorter hairs and longer patent "strigæ" on the costæ beneath; segments patent separated by broad sinuses. Receptacle with long hairs 160. *D. piloso-hispida* (Hook.) C. Chr.
7. Costæ beneath patently and softly hairy by long pluricellular hairs.
 8. Stipe glabrous or shortly pubescent.
 9. Basal segments not auricled, sori close to the edge.
 10. Pinnæ 10—15 cm long, scarcely 2 cm broad; costæ beneath with numerous long, pluricellular hairs 168. *D. mertensioides* C. Chr.
 10. Pinnæ up to 30 cm long, 3—4 cm broad; hairs shorter, seldom pluricellular 160. *D. piloso-hispida* (Hk.) C. Chr.
 9. Basal segments with an auricle at the inner side. Sori about medial.
 10. Segments linear-falcate with revolute margins, obtuse, the basal ones considerably reduced. Costæ beneath with several large, light-brown scales 165. *D. Ruiziana* (Kl.) C. Chr.
 10. Segments from a broad base tapering to the acute point, the lower basal one not or a little reduced. Costæ beneath very sparsely scaly 170. *D. multiformis* n. sp.
 8. Stipe, especially below, with a dense mass of woolly hairs 166. *D. lanipes* C. Chr.
 6. Sori, at least the upper ones, covered by the revolute margins of the segment. Basal segments not or a little reduced, the lower one often prolonged.
 7. Segments crenate 167. *D. horrens* Hieron.
 7. Segments entire.
 8. Margins densely ciliate; lower basal segment not prolonged and not auricled . . . 168. *D. mertensioides* C. Chr.
 8. Margins scarcely ciliate; lower basal segment always prolonged and auricled at the inner side 169. *D. cheilanthoides* (Kze.) C. Chr.
3. Sporangia setose. Species closely allied to *D. rudis*.
 4. South Brazil 157. *D. Heineri* C. Chr.
 4. Peru 156. *D. peruviana* Ros.
2. Lamina bipinnate or the lower segments of the larger pinnæ quite free.
 3. Basal segments or pinnules much reduced, not auricled. Hairs unicellular.
 4. Lamina rigidly coriaceous, quite glabrous 151. *D. semilunata* (Sod.) C. Chr.
 4. Lamina herbaceous or membranous, at least the costæ pubescent.
 5. Only the basal segments free 161. *D. euchlora* (Sod.) C. Chr.
 5. Several free pinnules.
 6. Pinnulæ (and segments) about 2 cm long, 2=3 mm broad, finely pubescent throughout, grass-green, herbaceous. Veins simple 145. *D. Bonapartii* Ros.
 6. Pinnulæ 3—5 cm long, $\frac{1}{2}$ cm broad, often deeply lobed, membranous, dark-green. Veins furcate.

7. Rachises and costæ glabrous or sparsely setose.
 8. Brazilian species 162. *D. Glaziovii* (Christ) C. Chr.
 8. Andine species. Sori close to the edge
 163. *D. pteroidea* (Kl.) C. Chr.
 7. Rachises and costæ villous. Sori about medial
 164. *D. cochaensis* n. sp.
 3. Basal segments, at least the lower one, not reduced and auricled
 at the inner side. Hairs long, pluricellular 170. *D. multiformis* n. sp.

54. ***Dryopteris pusilla*** (Mett.) O. Ktze. Rev. Gen. Pl. 2: 813. 1891; C. Chr. Ind. 287. — Fig. 12 a.

Syn. *Aspidium pusillum* Mett. Ann. sc. nat. V. 2: 245. 1864.

Type from Colombia, Fusagasuga, 1900 m, leg. LINDIG nr. 92 (B!), Bogotá, STÜBEL nr. 413 part. et 427 (B).

PERU, St. GAVAN, LECHLER nr. 2242 (B); Sachapeta, LECHLER nr. 2691 (B).

A species of doubtful position, not nearly related to any other. It is possible that it belongs to § *Cyclosorus*, which the very hairy, persistent indusia seem to indicate, still I place it here provisionally. The lamina is narrowed downwards gradually and the stipe is very short, but the lowermost pinnæ are not so small as could be expected in a species belonging to the group of *D. opposita*.

55. ***Dryopteris brachypoda*** (Bak.) C. Chr. Ind. 255. 1905. — Fig. 12 b.

Syn. *Nephrodium brachypodum* Bak. Timehri 5: 213. 1886; Trans. Linn. Soc. II. Bot. 2: 290. 1887; Jenman, W. Ind. and Guiana Ferns 207.

Type from British Guiana, upper slope of Mt. Roraima, IM THURN nr. 275 (Kew!).

A small species in general habit very much resembling *D. sagittata*, but a true *Lastrea* intermediate between *D. pusilla* and *D. coarctata*.

Rhizome erect, sparsely scaly. Leaves densely fasciculate, practically without stipe, lanceolate, 15 cm long, 2½ cm broad at the middle, narrowed very gradually towards the base through several pairs of dwindling pinnæ, firmly membranous, dark-green; rachis strigose, especially on the sides, glabrous in the furrow above, and clothed with many small, brown scales. Pinnæ sessile, alternate, horizontal, the largest 1½ cm long, 5–6 mm broad, obtuse, auricled on both sides of the base, slightly pilose on the costæ and main veins beneath, underside finely glandulose, the upper and lower ones entire, the middle and largest ones crenate or lobed one third of the way to the midrib, margins somewhat revolute. Secondary veins forked in the entire pinnæ, in the lobed pinnæ with 2–3 tertiary simple veins. Sori supramedial, furnished with rather large, persistent, at least red-brown, subglabrous indusia. Sporangia glabrous.

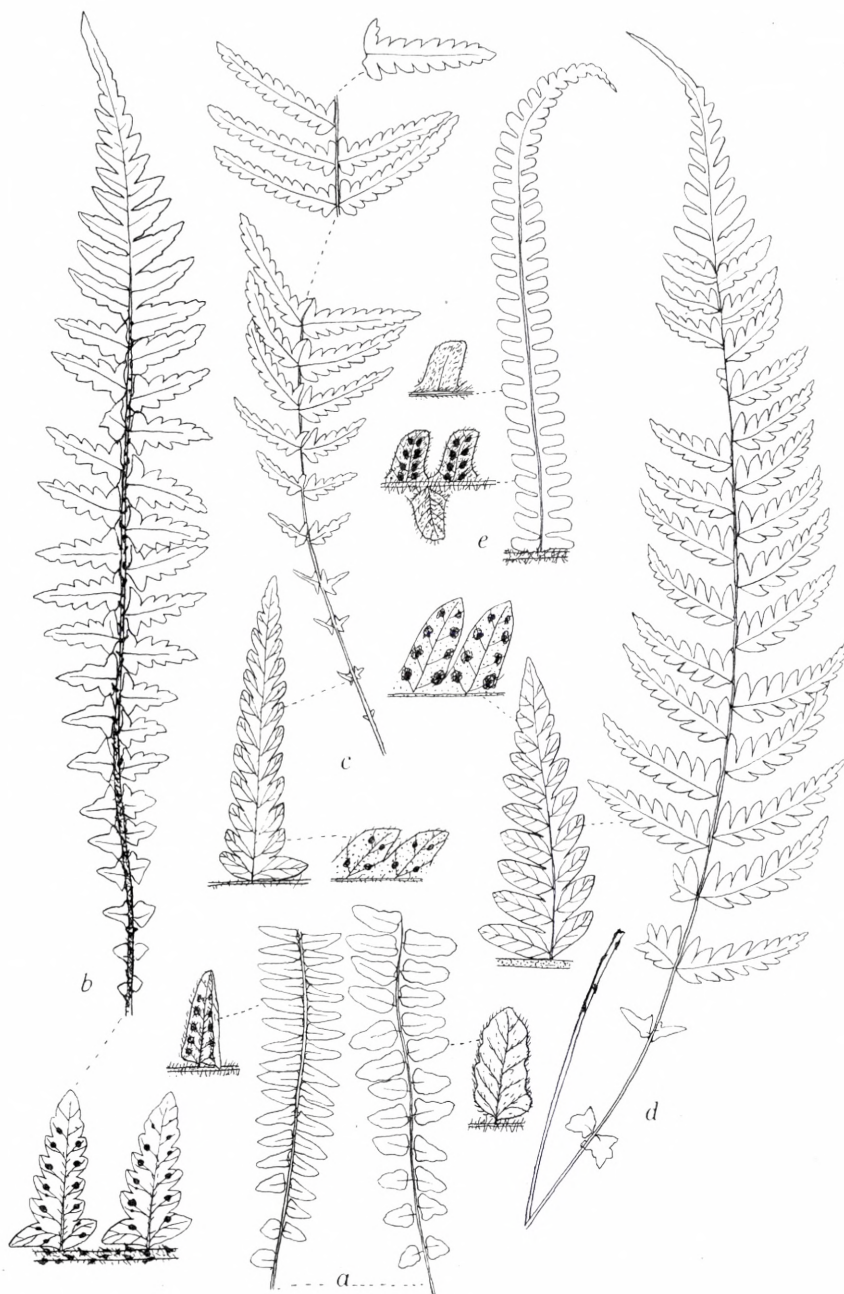


Fig. 12. *a. D. pusilla* (Mett.) O. Ktze. Lower part of two leaves, $\times \frac{4}{5}$, and two pinnæ, fertile and sterile, $\times 1\frac{1}{2}$. (orig.). — *b. D. brachypoda* (Bak.) C. Chr., entire leaf, $\times \frac{4}{5}$, and two pinnæ, $\times 1\frac{1}{2}$ (orig.). — *c. D. pseudosancta* C. Chr., base and middle part of a leaf, $\times \frac{4}{5}$, pinna, $\times 1\frac{1}{2}$ and two segments, $\times 3$ (orig.). — *d. D. sanctiformis* n. sp., entire leaf, $\times \frac{4}{5}$, pinna $\times 1\frac{1}{2}$ and two segments $\times 3$ (orig.). — *e. D. leucothrix* C. Chr., pinna $\times \frac{4}{5}$, three segments seen from the underside and one seen from above, $\times 1\frac{1}{2}$ (orig.).

This is a more robust plant than *D. pusilla* with all free pinnæ auricled on both sides of the base and the central ones lobed with subpinnate secondary veins. *D. coarctata* has most pinnæ regularly pinnatifid and a scaleless rachis. *D. sagittata* is apparently similar, but it belongs to § *Goniopteris* and its hairs are stellate.

56. *D. sancta* (L.) O. Ktze.; C. Chr. Revision nr. 32 fig. 20; Smiths. Misc. Coll. 52: 378.

Area: Dominica, Porto Rico, Haïti, Jamaica, Cuba, Guatemala.

57. *Dryopteris sanctiformis* n. sp. — Fig. 12d.

Type from Panama, eastern slope of Chiriqui Volcano, 2100—2300 m; leg. MAXON nr. 5294 (W).

Rhizomate erecto, breve, dense radicante, squamis parvis ovatis parce onusto. Stipitibus dense fasciculatis, gracilibus, rubrescentibus, nitidis, ad basin sparse paleaceis, glabris, 6—10 cm longis. Lamina anguste lanceolata, ad 22 cm longa, medio 3—4 cm lata, versus basin breviter attenuata, gramineo-viridi, firmo-herbacea, bipinnatifida; rachi gracili, brevissime et tenuissime puberula. Pinnis multijugis, sessilibus, alternis vel inferioribus suboppositis, falcatis, infimis 2—3 paris auriculiformibus, medialibus maximis, 2—2½ cm longis, basi 5—8 mm latis, acutis, supra ad costas sparse setosis, infra ubique glandulosis, inaequaliter pinnatifidis. Laciniis 6—7-jugis, ovato-oblongis, obliquis, acutis, anterioribus majoribus, basali anteriore semper maxima, posterioribus minoribus, basali minima. Venis simplicibus, 3—4-jugis. Soris supramedialibus, indusio late affixo glanduloso persistente obtectis. Sporangii glabris.

This new species resembles very much certain forms of *D. sancta*, mainly in size and its unequal-sided pinnæ; it differs by its indusiate sori and its lamina being shortly narrowed downwards about as in *D. concinna* or *D. Lindigii*, but its real affinity is with *D. sancta* and *D. pseudosanta*. The indusium is peculiar; it is glossy, red-brown and impressed in the centre, while the free edges are greenish or whitish and glandular; it is not exactly reniform but rather variable in shape.

To this species I refer SPRUCE nr. 5297 (RB) from Ecuador that is rather typical and further two other specimens, which are not glandular beneath and somewhat more pubescent but agree in size and shape of pinnæ:

Venezuela, EGGERS nr. 13260 (H).

Ecuador, Andes of Quito, SPRUCE nr. 5297 A (H, L).

58. *Dryopteris longicaulis* (Bak.) C. Chr. Index 275. 1905.

Syn. *Nephrodium longicaule* Baker, Journ. Bot. 1881: 204, et in Hook. Icon. pl. tab. 1658.

Type from Colombia, Province of Antioquia, leg. KALBREYER nr. 1454 (Kew!).

A remarkable species well figured by BAKER. It belongs to the small group of *D. sancta* by its narrow leaf and unequal-sided pinnæ differing from all other

species by its very long, epigæous caudex, about 20 cm long, $\frac{1}{2}$ cm thick, clothed throughout with squarrose, glossy, castaneous, lanceolate-acuminate, narrow, pubescent scales. Stipe glossy, glabrous, about 5–6 cm long to the lowermost pair of auriculiform pinnæ. Lamina 40–50 cm long, 5 cm broad, downwards rather suddenly narrowed, light-green when alive, brownish when dried, firmly herbaceous, the rachis slender, very slightly strigose above. Pinnæ very numerous, sessile, the lower 4–5 pairs opposite, very remote and very small, auriculiform; above them a single pair of larger, auriculiform pinnæ, the next following scarcely shortened; middle pinnæ alternate, 3 cm long, 7–8 mm broad, acute, auricled at the upper base, cuneate on the lower side, very finely pubescent on the upper surface, glabrous and eglandulose beneath, entire in the outer third, the upper margin lobed in the lower two-thirds about $\frac{1}{3}$ of the way to the midrib, the lower one lobed in the centre only. Upper basal lobe the largest, making the pinnæ auricled, central lobes about as broad as long, obtuse. Veins pinnate in the lobes with 1–3 pairs of tertiary simple veins. Sori medial, small; indusium subsistent, brown, glabrous. Sporangia glabrous.

In general habit this species resembles not a little a species of *Asplenium*, f. inst. *A. unilaterale* Lam., because the lower half of the basiscop side of the pinnæ is nearly cut away. The peculiar scaly stem not considered it differs from *D. sancta* and *D. sanctiformis*, its nearest relatives, by the less cut pinnæ and the lamina not being gradually but suddenly narrowed downwards.

59. *D. consanguinea* (Fée) C. Chr. Revision nr. 33 fig. 21; Smiths. Misc. Coll. 52: 380.

Area: Trinidad, Grenada, Martinique, Dominica, Guadeloupe. Jamaica (var. *aequalis*). Panama.

This species may be a small form of *D. limbata*. I refer to it a peculiar variety from Panama, Chiriqui, 1000–1300 m; MAXON nr. 5243a (W). It is in habit perfectly typical, but the underside is eglandulose and the sori are very small, consisting of some few (3–4) sporangia, without trace of indusia and placed very close to the margin nearly apical on the veins.

60. *D. delicatula* (Fée) C. Chr. Revision nr. 30.

Area: Guadeloupe. — The lamina is about 30 cm long, not 3 cm as erroneously stated in "Revision" 295.

D. hydrophila (Fée) C. Chr. and *D. caribaea* (Jenm.) C. Chr. do not belong here.

61. *D. pseudosanta* C. Chr. Smiths. Misc. Coll. 52: 378. — Fig. 12c.

Area: Costa Rica, Guatemala.

Dryopteris negligens (Jenm.) C. Chr. Index 279. — *Nephrodium negligens* Jenm. Bull. Bot. Dept. Jam. n. s. 3: 20. 1896. — Jamaica, is according to a photograph of the type-specimen in JENMAN'S type-herbarium in New York Bot. Garden, together with a small fragment kindly sent me by Miss SLOSSON a small species allied to *D. sancta*, but not unlike small forms of *D. oligocarpa*; it agrees with the latter in pubescence; some of the pinnæ (3×1 cm) are rather unequal-sided. It may be a valid species.

62. *D. physematioides* (Kuhn et Christ) C. Chr., Revision nr. 31.

Area: San Domingo.

63. *D. opposita* (Vahl) Urban; C. Chr. Revision nr. 25 fig. 15, 16; Smiths. Misc. Coll. 52: 375.

Area. Type: Lesser Antilles, common. Different forms occur in Jamaica, Cuba, Florida, Mexico, Colombia—Peru. var. *rivulorum* (Raddi): Southern Brazil.

I now regard *D. amphioxypteris* (Sod.) C. Chr., Revision nr. 52 as a variety of *D. opposita*, at least I can not distinguish specifically from that species an authentic specimen in Kew. It has the basal segments considerably enlarged and often lobed, and it has 8–10 veins to a side, but as to other characters it agrees very well with the typical form.

64. *D. riopardensis* Ros.; C. Chr., Revision nr. 26 fig. 17.

Area: South Brazil, Rio Grande do Sul.

This is most probably a form of *D. opposita* var. *rivulorum*.

65. *D. coarctata* (Kze.) C. Chr., Revision nr. 27 fig. 18.

Area: Venezuela—Colombia. Cuba, WRIGHT nr. 3925 (S, W), previously determined as *D. sagittata*, which it resembles in general habit but totally different in pubescence.

66. *D. leucothrix* C. Chr. Smiths. Misc. Coll. 52: 377. — Fig. 12 e.

Area: Bolivia.

67. *D. panamensis* (Pr.) C. Chr., Revision nr. 28 fig. 19. Smiths. Misc. Coll. 52: 376.

Area: Porto Rico, Jamaica, Cuba; Mexico to Panama, very common.

Additional synonyms of this variable species are, according to the original specimens, the following:

Lastrea Leiboldiana Pr. Epim. 41. 1849, Mexico, LEIBOLD (Hb. PRESL!), exactly identical with *P. litigiosum* Liebm.

Aspidium Ghiesbreghtii Fourn. Mex. Pl. 1: 94, 1872, Mexico, GHIESBREGHT, BOURGEOU nr. 3615 (Mus. Paris!).

Nephrodium caribaeum Jenm. Journ. Bot. 1886: 270; Bull. Dept. Jam. n. s. 3: 21. 1896.

Dryopteris caribaea C. Chr. Ind. 257. 1905.

Jamaica; Mt. Diabolo, SHERRING (Kew, authentic specimen; New York Bot. Gard., a leaf of JENMAN's type collection received from Miss SLOSSON).

Nearly identical with the narrow form of *D. panamensis* upon which PRESL founded his new species. JENMAN does not mention the glandular underside.

Polypodium gracilentum Jenm., Bull. Dept. Jam. n. s. 4: 129. 1897; *Dryopteris gracilentata* C. Chr. Ind. 268, which I believed (Revision p. 294) to be *D. panamensis* is not that species according to two pinnæ of the type-specimen in the JENMAN collection in New York Bot. Garden, kindly sent me by Miss MARGARET SLOSSON. It may be a distinct species, allied to *D. scalpturoides*. The sori are apparently indusiate, but the indusia are very small with long hairs, which nearly completely conceal the young sporangia.

68. *D. silviensis* Hieron.; C. Chr. Revision nr. 29.

Area: Colombia.

69. *D. scalpturoides* (Fée) C. Chr., Revision nr. 34, fig. 22; Smiths. Misc. Coll. 52: 381.

Area: Cuba, Jamaica.

70. *D. concinna* (Willd.) O. Ktze.; C. Chr. Rev. nr. 1 fig. 2; Smiths. Misc. Coll. 52: 369.

Area: Guadeloupe, Jamaica, Cuba, Mexico to Ecuador.

71. *Dryopteris rufa* (Poir.) C. Chr. Ind. 290. 1905.

Syn: *Polypodium ruffum* Poir. Enc. méth. 5: 532. 1804.

Type from Peru, Lima (Herb. LAMARCK, Mus. bot. Paris!); another specimen from Lima, WATSON nr. 818 (RB) is perfectly typical.

In my "Revision" pag. 274 I suggested this to be the Chilene form of *D. argentina*, which is not the case. *D. rufa* is a distinct species, in general habit resembling *D. concinna* and *D. oligocarpa*, well-marked by its setose sporangia as in *D. concinna*, but rachis and costæ of both sides are sparsely pubescent by short hairs, not densely pulverulent as in *D. concinna*; leaf otherwise glabrous. — Lamina 40—50 cm long by 10 cm wide, narrowed downwards as in the two species mentioned; pinnæ opposite, firm; segments close, patent, acute; veins about 8 to a side; sori about medial; indusium not seen.

72. *D. Stierii* (Ros.) C. Chr., Revision nr. 2 fig. 3.

Area: Brazil, Rio Grande do Sul.

73. *Dryopteris blanda* (Fée) C. Chr. Index 254. 1905. — Fig. 13.

Syn. *Phegopteris blanda* Fée, 8. mém. 91. 1857.

Phegopteris caespitosa Fourn. Mex. Pl. 1: 89. 1872.

Polypodium caespitosum Bak. Syn. Fil. 305. 1874.

Dryopteris caespitosa C. Chr. Index 256. 1905.

Type from Mexico, Mirador, leg. SCHAFFNER nr. 222 (specim. auth. in Kew!).

A small species, not unlike small forms of *D. oligocarpa*, but the lower pinnæ not or very slightly reduced. — Rhizome erect or decumbent, small, scales very few. Stipes very slender, 15—20 cm long, stramineous, glabrous. Lamina 12—15 cm

long by 7 cm broad at the middle, ovate-lanceolate, acuminate, somewhat narrowed downwards, herbaceous, dark-green. Rachis slender, short-hairy. Pinnæ 7—8 to a

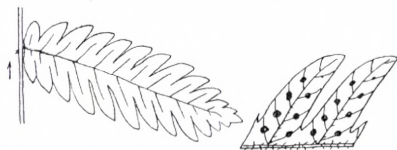


Fig. 13. *D. blanda* (Fée) C. Chr. Pinna $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$ (BOURGEAU 2005).

side, sessile, suddenly narrowed into a short, entire apex, $3\frac{1}{2}$ cm long, $1\frac{1}{2}$ cm broad, the lowest pair generally somewhat shortened and reflexed; costæ on both sides sparsely pubescent by a few longer and more numerous very short hairs, surfaces otherwise glabrous. Segments 9—10-jugate, oblong oblique, connected by a wing $1\frac{1}{4}$ mm broad, the sinuses between acute, entire or slightly repand, the basal ones of lower pinnæ shortened, of upper ones

equal or a little prolonged. Veins 5—6 to a side, simple, oblique. Sori a little below the middle of the vein, exindusiate. Sporangia glabrous.

A very distinct species not easily to be confounded with others. It is not probable that FOURNIER had seen an authentic specimen of *Ph. blanda*, since he described his *Ph. caespitosa* as new; the two are exactly the same species. FÉE described the rhizome as "rampant", but on the label to the specimen at Kew is written: "rhizome decumb. terminal fronds".

Specimens seen:

Mexico: Vera Cruz, JARED G. SCHMITH nr. 63 (W); Cordova, BOURGEAU nr. 2005 (H, W, Mus. Paris. *Ph. caespitosa* Fourn.), H. FINK nr. 96a (W).

Guatemala: vicinity of Cacao, BARBER nr. 171 (W, pinnæ acuminate). Alta Verapaz, near the Finca Sepacuite, COOK and GRIGGS nr. 57 (W).

Costa Rica: WERCKLÉ nr. 130 (C) — Grenadilla, Finca Hermes, BRADE nr. 412 (R).

74. *Dryopteris tabлана* (Christ) C. Chr. Ind. 297. 1905. — Fig. 14.

Syn. *Aspidium tablanum* Christ, Bull. l'Herb. Boiss. II. 5: 727. 1905.

Type from Mexico: Chiapas, San Pablo, tierra templada "auf Lehmboden", leg. MUNCH nr. 146 (C!). — The Costa Rican specimen mentioned by CHRIST belongs to *D. blanda*.

Very like *D. blanda*, but larger: stipe 20 cm long, lamina 25×12 cm, slightly ciliate and costæ above strigose, otherwise entirely glabrous. Pinnæ opposite, linear, shortly acuminate, $6-6\frac{1}{2}$ cm long, 12—13 mm broad, the lower ones reflexed and not shortened, but below them I find in a single leaf a pair of small auricles. Segments very obtuse, almost with a truncate apex that is crenato-dentate. Veins 4—5-jugate, not very oblique. Sori supramedial with a distinct, glabrous indusium. Sporangia glabrous. — Rhizome erect, 1 cm thick, 8 cm high, scaleless.

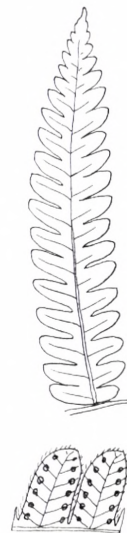


Fig. 14. *D. tabлана* (Christ) C. Chr. Pinna $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$. (orig.)

75. *Dryopteris Rimbachii* Ros. Fedde, Repert. 7: 147. 1909.

Type from Ecuador, Mt. Tunguragua, 2500 m, leg. RIMBACH nr. 119 (R! CC).

Well-marked by its coriaceous lamina and long basal scales; the leaf is very shortly narrowed towards the base and bears 2–3 pairs of close, auriculiform pinnæ. In general habit it resembles closely *D. Pavoniana*, specimens of which were collected at the same locality by Dr. RIMBACH (nr. 118, R, CC), but that species has a long-creeping, branched rhizome and wants the long basal scales and auriculiform pinnæ.

76. *Dryopteris brachypus* (Sod.) C. Chr. comb. nov.

Syn. *Nephrodium brachypus* Sod. Rec. 43. 1883; Cr. vasc. quit. 228. 1893.

Type from Ecuador, ad viam Quito-Guayaquil, leg. SODIRO (specim. auth. in Kew!).

Rhizome erect, up to 15 cm long, 1 cm thick, like the base of stipe densely clothed with narrow, subulate, brown, firm, finely hairy, squarrose scales; similar scales are scattered along the stipe and rachis, but they are deciduous and not always found. Stipites fasciculated, about 10 cm long, finely hairy. Lamina 40–70 cm long, 10–15 cm broad, downwards gradually but rather shortly attenuate, firmly membranous, not glossy above, pale-green beneath, the upperside finely pubescent by adpressed hairs, the channelled costæ more decidedly strigose, the underside nearly glabrous; rachis sulcate and hairy above. Middle pinnæ 6–9 cm long, $1\frac{1}{2}$ – $1\frac{3}{4}$ cm broad, shortly acuminate, the lower ones gradually shortened, the lowermost auriculiform, about 1 cm long. Segments a little oblique, acute, larger ones often faintly toothed, the basal ones equal. Veins 5–7-jugate, simple, rather indistinct. Sori close to the margin with glabrous sporangia; indusium not seen; according to SODIRO it is puberulous.

D. brachypus is in general habit not unlike *D. oligocarpa*; it is best characterized by its numerous basal, squarrose scales, agreeing in this character with the two following species; these three species (and perhaps *D. Rimbachii*) form a proper little group marked by the said character.

77. *Dryopteris supranitens* Christ, Fedde, Repert. 8: 19. 1910.

Type from Costa Rica, Tablazo, Finca Haberl, A. et C. BRADE nr. 270 (R!); specimens from Panama, Chiriqui, MAXON nr. 5244 (W) are very alike.

Closely related to *tablaziensis* with similar basal scales; it differs by its rigid texture, glossy upperside, narrower lamina that is suddenly narrowed downwards with 4–5 pairs of distant glanduliform pinnæ (type IV), by its sparse pubescence and long-acuminated pinnæ. From *D. brachypus* it differs in shape of lamina and nearly glabrous upperside. — A peculiar form with the segments distinctly serrated is MAXON's nr. 5524 from Panama (W).

78. *D. tablaziensis* Christ; C. Chr. Revision nr. 7 fig. 6.

Area: Costa Rica and Panama (MAXON nr. 5287 and 5336, W).

The rhizome is erect, about 10 cm high, 1 cm thick. In MAXON's specimens I find small, castaneous scales on the costæ beneath.

79. *D. Lindigii* C. Chr., Revision nr. 15.

Area: Costa Rica, Colombia, Venezuela.

80. *D. lustrata* (Hieron.) C. Chr., Revision nr. 14.

Area: Colombia, Peru.

81. *Dryopteris hydrophila* (Fée) C. Chr. Index 271. 1905.

Syn. *Phegopteris hydrophila* Fée, 11 mém. 56 tab. 13 fig. 3. 1866.

Polypodium hydrophilum Bak. Ann. of Bot. 5: 456. 1891.

Type from Guadeloupe, leg. L'HERMINIER (Herb. COSSON, Paris!); MAZÉ nr. 363 et 843 (Kew!).

In my Revision pag. 294—295 I believed that *Ph. hydrophila* and *Ph. delicatula* were forms of one species; this is not the case, *Ph. hydrophila* being a distinct species closely related to *D. oligocarpa*, while *Ph. delicatula* is allied to *D. sancta*. *D. hydrophila* was well figured by Fée; it resembles in general habit very closely *D. oligocarpa* and *D. Lorentzii* differing from both by its inframedial sori, which are furnished with minute, ciliate indusia, not seen by FÉE. Rachis slender, subglabrous beneath; pinnæ with a large, tuberculiform aërophore at the base beneath, broadest at the base, very finely and rather sparsely pubescent above, the costæ and veins beneath shortly and sparsely hairy. Segments very oblique, broad, acute, the basal ones equal-sized, the upper one parallel to rachis, the lower one much oblique. Veins 5-jugate, distant, oblique. — FOURNIER (Pl. mex. 1: 89) referred to this species a plant from Mexico, San Luis Potosi, VIRLET nr. 44.

82. *D. Lorentzii* (Hieron.) C. Chr., Revision nr. 3 fig. 4.

Area: Argentina.

83. *D. argentina* (Hieron.) C. Chr., Revision nr. 4.

Area: Argentina, Chile—Peru, Bolivia.

84. *D. oligocarpa* (H. B. Willd.) O. Ktze.; C. Chr. Revision nr. 5 fig. 5; Smiths. Misc. Coll. 52: 370.

Area: Mexico—Bolivia; Cuba, Jamaica, Haïti, St. Kitts. — South Brazil (var. *retusa* (Sw.)). Beautiful specimens of this species were recently collected in Panama by MAXON, nr. 4936, 4970, 5242 (W). It varies considerably in pubescence and I now regard *D. navarrensis* Christ; C. Chr. Misc. Coll. 52: 371 as a very hairy variety with several of the longer hairs consisting of 2—4 cells.

85. *D. pilosula* (Kl. & Karst.) Hieron.; C. Chr. Revision nr. 6.

Area: Mexico—Peru.

This, also, is most probably only a variety of *D. oligocarpa*.

86. *Dryopteris rivulariformis* Ros., Fedde, Repert. 6: 316. 1909.

Syn. *Dryopteris stenophylla* Ros., Fedde, Repert. 5: 233. 1908 (non C. Chr.).

Type from Bolivia, Yungas, Sirupaya pr. Yanacachi, leg. BUCHTIEN nr. 495.

Of this I have seen only a single pinna, kindly sent me by Dr. ROSENSTOCK.

It appears to be a good species.

87. *D. Regnelliana* C. Chr., Revision nr. 20 fig. 12.

Area: Brazil, Minas Geraes.

88. *D. rioverdensis* C. Chr., Revision nr. 19 fig. 11.

Area: Brazil, Minas Geraes.

89. *D. Nockiana* (Jenm.) C. Chr., Revision nr. 8 fig. 7; Smiths. Misc. Coll. 52: 371.

Area: Jamaica.

90. *D. muzensis* Hieron.; C. Chr. Revision nr. 10.

Area: Colombia.

91. *D. columbiana* C. Chr. Revision nr. 9 fig. 8; Smiths. Misc. Coll. 52: 372.

Area: Colombia—Panama.

Specimens of MAXON'S recent collection from Panama (nr. 5202, W) shows that this is clearly distinct from *D. oligocarpa*.

92. *D. piedrensis* C. Chr., Smiths. Misc. Coll. 52: 372.

Area: Cuba, Gran Piedra, Oriente, MAXON nr. 4041 (W); J. A. SHAFER nr. 8954 (C. Chr.).

93. *D. boqueronensis* Hieron.; C. Chr. Revision nr. 11.

Area: Colombia.

94. *D. lepidula* Hieron.; C. Chr. Revision nr. 12.

Area: Colombia.

95. *D. Lindmani* C. Chr., Revision nr. 13 fig. 9.

Area: Brazil: Sao Paulo, MOSÉN; HEINER nr. 523 (Rg).

96. *D. laevigata* (Mett.) C. Chr., Revision nr. 17 fig. 10.

Area: Peru.

97. *Dryopteris Crossii* (Bak.) C. Chr. Index 259. 1905.

Syn. *Polypodium Crossii* Bak. Ann. of Bot. 5: 455. 1891.

Type from Ecuador, Sierra de Roritroche, Andes of Loja, leg. Cross, Oct. 1861 (Kew!).

A very fine plant very near (too near?) to *D. laevigata*, which it resembles by its purplish-castaneous stipe and rachis, size and texture of lamina, but the lamina is more gradually narrowed downwards and the costæ are strigosely hairy beneath.

Rhizome? Stipe to the lowest pair of glanduliform pinnæ up to 15 cm long, like rachis purplish-castaneous, glossy and quite glabrous. Lamina lanceolate, 25–35 cm long, 6–7 cm broad at the middle, narrowed towards both ends, coriaceous, brown when dry. Pinnæ close, sessile, subopposite or alternate horizontal or slightly ascending, the lower 3–4 pairs very small, like tubercles on the stipe at distances of 3–4 cm; above them 2–3 pairs of gradually larger auriculiform pinnæ, middle ones the largest, 3–3½ cm long, about 8 mm broad, acute but scarcely acuminate, glabrous above, strigose on the costa beneath, furnished with a large, 2–3 mm long aërophore at the base beneath, incised to a wing 1–1½ mm broad. Segments a little oblique, close, obtuse but the margins being revolute apparently acute, and triangular of shape, the basal ones equal or a little longer. Veins about 6 to a side; sori a little above the middle of the vein, exindusiate, small, consisting of a few sporangia only.

98. *D. Galanderi* (Hieron.) C. Chr. Revision nr. 16.

Area: Argentina, Minas Geraes.

99. *Dryopteris Millei* sp. nov.

Ecuador, in pascuis gelidis Andium Palaguillo, 3300 m, leg. A. MILLE nr. 125 (RB!).

Rhizomate breve, decumbente, apice squamis lanceolatis castaneis hirtis onusto. Stipitibus longissimis, usque ad 40 cm longis, fasciculatis, brunneo-stramineis basi fusciscentibus et sparse squamosis, nitidis, decidue hirtis denique glabris, vix ultra 1½ mm crassis. Lamina lanceolata, utrinque attenuata, raro ad 20 cm longa, medio 2–5 cm lata, rigide coriacea, pallide viridi. Rachi straminea, pilis albidis patentibus decidue hirta. Pinnis 10–20-jugis, inferioribus sensim reductis more *D. oligocarpicae* (typus I), saepe reflexis, medialibus maximis, raro ultra 2 cm longis, sessilibus, horizontalibus vel leviter falcatis, apice integro acuto, ciliatis, costis utrinque et costulis infra setis antrorsis setulosis, inter venas glabris et eglandulosis, infra apicem integrum vel serratum ad alam 2 mm latam pinnatifidis. Laciniis 5–6-jugis, ovatis, subobtusis, obliquis, marginibus dense ciliatis revolutis, basalibus aequalibus vel parum auctis. Venis 2–4-jugis, indivisis. Soris infra medium venularum sitis, rotundis, exindusiatis; sporangiis glabris.

A distinct new small species, remarkable by its very long stipe and small lamina of coriaceous texture. It is related to *D. laevigata*, from which it differs by its stramineous rachis and setulose costæ.

100. *Dryopteris phacelothrix* C. Chr. et Ros. n. sp. — Ros. Fedde, Reperit 11: 56. 1912.

Bolivia: Yungas borealis, Unduavi, 3300 m, leg. O. BUCHTIEN nr. 2707 et 2709 (R).

Lastrea rhizomate oblique adscendente seu suberecto, paleis ferrugineo-brunneis, lanceolatis, dorso margineque pilosulis vestitis. Stipitibus fasciculatis, c. 15 cm longis, 2 mm crassis, stramineis, paleis adpressis, iis rhizomatis similibus ornatis pilisque brevibus, strictis, 2—6 fasciculatis vel simplicibus dense hirtis. Laminis elongato-ovalibus utroque breviter et gradatim attenuatis, ad 50 cm longis, 12 cm latis, pinnato-pinnatifidis, subcoriaceo-chartaceis, utrinque viridibus, in rachibus, costis nervisque densius, inter nervos parcius hirto-pilosis, pilis iis stipitis similibus, rachibus costisque paleis ovato-lanceolatis brunneis persistentibus adpersis. Pinnis infra apicem brevem pinnatifidum c. 30-jugis, subapproximatis, infra oppositis, sursum alternis, recte patentibus, subsessilibus, profunde pinnatifidis, medialibus c. 5¹/₂ cm longis, 1¹/₄ cm latis, e basi subæquali vel anteriore paullisper adaucta lineari lanceolatis, breviter acuminatis, inframedialibus sensim brevioribus, inferioribus remotis et citius abbreviatis, infimis auriculiformibus, superioribus sensim diminutis et minus profunde incisis, postremis basi lata sessilibus, demum confluentibus et in apicem laminae secretum sensim transeuntibus. Segmentis pinnarum majorum subrecte patentibus, linearibus, obtusis, c. 5 mm longis, 2 mm latis, margine crenulato, subrevoluto seu integerrimo, plano, sinibus acutis interstinctis, ala 1 mm fere lata confluentibus; venulis lateralibus ad 6-jugis, supra prominentibus, subtus prominulis, simplicibus, parallelis, basalibus longe supra sinum marginem attingentibus. Soris medialibus, exindusiatis, pilis fasciculatis sporangiis intermixtis. (ROSENSTOCK descripsit.)

I am due to Dr. ROSENSTOCK a specimen of this species unique by its peculiar pubescence. Without a minute examination several of the hairs appear to be stellate but the whole aspect of the species is that of *Lastrea* not of *Goniopteris*. By microscopical analysis I found, however, that the hairs are not stellate, i. e. branched, but fasciculate, as Dr. ROSENSTOCK expresses it, i. e. 2—6 hairs spring out from the same epidermal cell from nearly the same point.

101. *D. caucaensis* (Hieron.) C. Chr., Revision nr. 21 fig. 13.

Area: Costa Rica—Colombia, and it is now also found in Bolivia, BUCHTIEN nr. 2697 (R).

102. *D. Funckii* (Mett.) O. Ktze.; C. Chr. Revision nr. 35 fig. 23.

Area: Venezuela—Colombia and it is now also recorded from Costa Rica: Volcano Barba, BRADE nr. 289 (R). — The species has its proper position here.

103. *D. velata* (Kze.) O. Ktze.; C. Chr. Revision nr. 22; Smiths. Misc. Coll. 52: 373.

Area: Cuba.

104. *D. aspidioides* (Willd.) C. Chr., Revision nr. 23.

Area: Costa Rica—Peru.

105. *D. ptarmica* (Kze.) O. Ktze.; C. Chr. Revision nr. 24 fig. 14.

Area: Southern Brazil.

106. *D. pachyrachis* (Kze.) O. Ktze., C. Chr. Revision nr. 44 fig. 31; Smiths. Misc. Coll. 52: 382.

Area: Panama—Venezuela—Ecuador. Southern Brazil (var. *platyrachis* (Fée) C. Chr.). — Jamaica, St. Vincent (var. *Jenmani* (Bak.) C. Chr.).

The specimens from Panama collected by MAXON nr. 5274 (W) are very similar to var. *bogotensis* C. Chr. Revision 306, which differs from typical *D. pachyrachis* by its pubescent rachis and upperside. Similar more hairy forms occur in Ecuador and I think I was right in referring *Nephrodium crassipes* Sod. and *N. stramineum* Sod. to *D. pachyrachis*. A third variety is no doubt

Nephrodium Sprucei Bak. Syn. Fil. 269, 1867.

Dryopteris Sprucei O. Ktze. Rev. 2: 813. 1891; C. Chr. Index 294.

Ecuador, Mt. Tunguragua, SPRUCE nr. 5299, Llalla, SPRUCE nr. 5299 A, Montaña de Canelos, SPRUCE nr. 5301 (all Kew!).

BAKER founded his new species on these three specimens, which were all referred to *N. resinoso-foetidum* by HOOKER; they are, however, not quite identical. Best agreeing with BAKER's description are nr. 5299 A and 5301. Nr. 5301 is as to all characters the eglandulose underside excepted typical *D. pachyrachis*; nr. 5299 A is nearly the same, but the upperside is rather pubescent, the underside and indusium sparsely glandular with the characteristic large, red glands, and the costæ beneath bear some few thin, brown scales. Nr. 5299 looks very different, but it is certainly a large-growing, thin-leaved form of *D. pachyrachis*. Its pinnae are 20 cm long, 3½ cm broad, rather densely hairy above, glabrous and slightly glandular beneath, the costæ rather scaly, and the irregular (sometimes subthyrioid) very large indusia slightly ciliate and glandular by large, red glands. Segments 5 mm broad with about 10 veins to a side.

The var. *Jenmani* (Bak.) C. Chr. may be specifically different (see Smiths. Misc. Coll. 52: 382—383); still it differs scarcely more from the type than do some of the Andine forms. The most different form is the large, very thin-leaved and densely glandulose variety that I erroneously in "Revision" referred to *D. Germaniana* as var. *glandulosa*. It was also collected by W. HARRIS nr. 7485 (B), Jamaica, Blue Mountain Peak.

107. *D. supina* (Sod.) C. Chr., Revision nr. 46 fig. 32.

Area: Ecuador—Colombia.

The var. *Biolleyi* Christ is a small form of *D. cheilanthoides*.

108. *D. tenerrima* (Fée) Ros.; C. Chr. Revision nr. 50.

Area: Southern Brazil.

109. *D. palustris* (Mett.) O. Ktze.; C. Chr. Revision nr. 49 fig. 33.

Area: Southern Brazil.

110. *D. Hieronymusii* C. Chr., Revision nr. 45.

Area: Colombia.

111. *D. roraimensis* (Bak.) C. Chr.; Smiths. Misc. Coll. 52: 383. — Fig. 15a.

Area: Guiana, Mt. Roraima, IM THURN nr. 168 (Kew!).

In the type-specimen the segments are scarcely falcate but often faintly crenate.

112. *D. utañagensis* Hieron.; C. Chr. Revision nr. 47.

Area: Ecuador.

113. *Dryopteris illicita* Christ, Bull. Soc. bot. Gèneve II. 1: 225. 1909.

Type from Costa Rica, La Palma, WERCKLÉ (not seen).

To this species I refer specimens from Candelaria, Costa Rica, A. et C. BRADE nr. 410 (R). It is a very large species remarkably resembling a glabrous form of *D. patens*, but the venation and the decrescent lamina show that it is a member of the subgenus *Lastrea*. The thick, quadrangular, stramineous rachis and the costæ are sparsely pubescent above, otherwise the leaf is quite glabrous and eglandulose, but the costæ and costulæ bear beneath some thin, light-brown scales. Segments close, subfalcate, acute, the basal ones both prolonged and parallel to rachis as in *D. patens*. Veins about 10 to a side. Sori supramedial with subpersistent, glabrous indusia.

114. *D. atropurpurea* Hieron.; C. Chr. Revision nr. 48.

Area: Colombia. — See remarks under *D. euchlora*.

115. *D. recumbens* Ros.; C. Chr. Revision nr. 51.

Area: South Brazil.

116. *D. rustica* (Fée) C. Chr., Revision nr. 53; Smiths. Misc. Coll. 52: 383.

Area: Guadeloupe, St. Vincent. Jamaica (var. *nimbata* (Jenm.), indusiate; authentional specimen in Kew!).

117. **D. Germaniana** (Fée) C. Chr., Revision nr. 55, Smiths. Misc. Coll. 52: 384.

Area: Guadeloupe, Porto Rico (t. W. R. MAXON), Cuba.

The variety *glandulosa* Revision 311 belongs to *D. pachyrachis*.

118. **D. melanochlaena** C. Chr. Smiths. Misc. Coll. 52: 384. — Fig. 15 b.

Area: Guatemala.

119. **D. atrorubens** (Mett.) C. Chr., Revision nr. 54 fig. 34.

Area: Peru.

120. **D. demerarana** (Bak.) C. Chr., Smiths. Misc. Coll. 52: 385. — Fig. 15 d.

Area: Guiana, Mt. Roraima, IM THURN nr. 356 (Kew!).

Best marked by its subopposite very distant pinnæ. Closely allied to *D. rustica*.

121. **D. dominicensis** C. Chr. Smiths. Misc. Coll. 52: 384. — Fig. 15 c.

Area: Dominica; Martinique, HUSNOT nr. 356 (CC); Guadeloupe, MAZÉ nr. 647.

122. **D. Moritziana** Urban; C. Chr. Revision nr. 56 fig. 35.

Area: Venezuela.

123. **Dryopteris nitens** (Desv.) C. Chr. comb. nov. — Fig. 15 e.

Syn. *Polypodium nitens* Desv. Prodr. 240. 1827.

Dryopteris bañiensis Ros. Fedde, Repert. 7: 301. 1909!

Type from Peru, (Herb. Mus. Paris!). — Ecuador, Baños, SPRUCE sine num. (RB).

This was founded on an incomplete specimen but is apparently a very distinct species. The original specimen consists of the lower half of a lamina with a part of the stipe, which is stramineous and glabrous. Lowest pair of pinnæ deflexed and below them a pair of auriculiform pinnæ. Pinnæ opposite, sessile, 12 cm long by 2 cm broad, acuminate, thinly herbaceous, the costæ above pilose, costæ, costulæ and veins beneath long- and soft-hairy by whitish, thin, pluricellular hairs, the costæ besides furnished with a few small, red, thin scales. Rachis stramineous, deciduously hairy. Segments close, connected by a wing $1\frac{1}{2}$ mm broad, bluntly rounded at the apex, the margins obscurely crenate, ciliate, 6—7 mm broad, the lower pair not reduced. Veins simple, 8-jugate. Sori medial, reddish, exindusiate.

D. bañiensis Ros. based on a single leaf with a pinnatifid apex is quite the same.

124. **D. diplazioides** (Desv.) Urban; C. Chr. Revision nr. 58.

Area: Mexico—Colombia, Bolivia (BUCHTIEN nr. 1126, 1130, R). San Domingo, Guadeloupe. South Brazil (var. *brevisora* Ros.).

125. *D. consimilis* (Fée) C. Chr., Revision nr. 59 fig. 37, Smiths. Misc. Coll. 52: 386.
Area: Guadeloupe, Jamaica.
126. *D. heteroclita* (Desv.) C. Chr., Revision nr. 60 (vix fig. 38 = *D. consimilis*?);
Smiths. Misc. Coll. 52: 386.
Area: Jamaica.

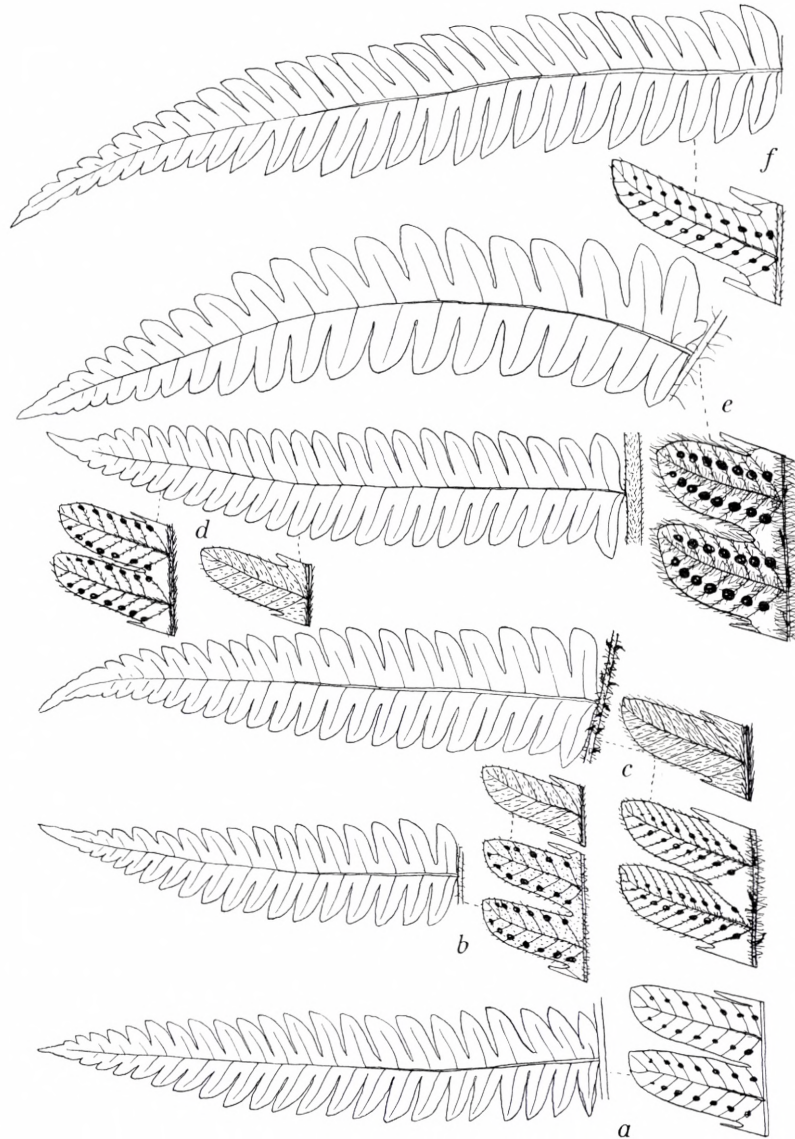


Fig. 15. *a.* *D. roraimensis* (Bak.) C. Chr. (orig.). — *b.* *D. melanochlæna* C. Chr. (orig.). — *c.* *D. dominicensis* C. Chr. (orig.). — *d.* *D. demerarana* (Bak.) C. Chr. (orig.). — *e.* *D. nitens* (Desv.) C. Chr. (orig.). — *f.* *D. Bradei* Christ (orig.). — All pinnae $\times \frac{4}{5}$, segments $\times 1\frac{1}{2}$, those without sori seen from above.

127. *D. atrovirens* C. Chr.; Revision nr. 61 fig. 39.

Area: Guatemala, Costa Rica; Panama, MAXON nr. 5649, 5651 (W).

128. *Dryopteris leptogrammoides* Ros., Fedde Repert. 9: 68. 1910.

Type from Costa Rica, La Palma, A. et C. BRADE (R!).

A critical species founded on a part of a single leaf. It is near large forms of *D. atrovirens*.

129. *D. firma* (Bak.) C. Chr., Revision nr. 36 fig. 24; Smiths. Misc. Coll. 52: 381.

Area: Jamaica.

130. *D. Pavoniana* (Kl.) C. Chr., Revision nr. 18.

Area: Peru, Bolivia; Ecuador, Mt. Tunguragua, RIMBACH nr. 118 (R, CC).

As shown by the specimen quoted this has a wide-creeping, branched rhizome like *D. firma*. Together with that species and *D. Rosenstockii* it forms a narrow group of species, which are not nearly allied to the South Brazilian species with a wide-creeping rhizome.

131. *D. Rosenstockii* C. Chr. Revision nr. 43 fig. 30.

Area: Ecuador.

132. *D. Santae Catharinae* Ros.; C. Chr. Revision nr. 37 fig. 25.

Area: South Brazil.

133. *D. Jürgensii* (Ros.) C. Chr.; Revision nr. 38 fig. 26.

Area: South Brazil.

134. *D. Mosenii* C. Chr., Revision nr. 33 fig. 27.

Area: Brazil: Minas Geraes.

135. *D. rivularioides* (Fée) C. Chr., Revision nr. 41 fig. 29.

Area: Brazil (Minas Geraes to Rio Grande do Sul), Paraguay, Uruguay, Argentina: Misiones (EKMAN, S).

A series of specimens received from M. B. BERRO, Montevideo, shows that *D. pseudomontana* (Hieron.) C. Chr., Revision nr. 40 fig. 28 is only a form of the variable *D. rivularioides*.

136. *D. scariosa* Ros.; C. Chr., Revision nr. 42.

Area: South Brazil.

137. *Dryopteris tremula* Christ in Lecomte, Notulæ Syst. 1: 234. 1910.

Type from Mexico: state of Michoacan, Morelia, leg. G. ARSÈNE nr. 3106.

I have not seen the type-specimen but numerous specimens from the type-locality collected by ARSÈNE (RB). Unfortunately they are all sterile and without rhizome. Judging from these specimens I cannot with certainty distinguish them from *D. thelypteris*, which has not been found in tropical America; Dr. CHRIST⁶ however, finds that it differs from *D. thelypteris* by its plane fertile segments and minute, remote sori. I, therefore, prefer to let it stand provisionally as a species. It is widely different from all other tropical American species of § *Lastrea* by its non-attenuate lamina and normally furcate veins.

138 *D. siambonensis* (Hieron.) C. Chr., Revision nr. 63 fig. 41.

Area: Argentina.

139. *D. achalensis* (Hieron.) C. Chr., Revision nr. 64.

Area: Argentina.

140. *D. Sprengelii* (Klf.) O. Ktze.; C. Chr. Revision nr. 65 fig. 42; Smiths. Misc. Coll. 52: 387.

Area: West Indian Islands, common; Mexico along the Andes to Ecuador.

Nephrodium Sherringii Jenm. Journ. Bot. 1879: 261, from Jamaica, of which I have now seen an authentic specimen (Kew), I regard as a large, luxuriant variety of *D. Sprengelii*. It agrees with typical *Sprengelii* in colour, texture and pubescence, but it is much larger with pinnæ 12—20 cm long, 3—5 cm broad, the segments of larger pinnæ about 3 cm long, $\frac{1}{2}$ cm broad, deeply lobed with the tertiary veins furcate or even pinnately branched in the lobes.

141. *D. struthiopteroides* C. Chr., Smiths. Misc. Coll. 52: 388.

Area: Guatemala.

142. *D. Mercurii* (A. Br.) Hieron.; C. Chr. Revision nr. 66 fig. 43; Smiths. Misc. Coll. 52: 389.

Area: Mexico along Andes to Ecuador.

It is highly questionable, whether this is specifically distinct from *D. Sprengelii*. I am nearly sure that it is not. Specimens from Panama (MAXON nr. 4696 and 5767) show the pubescence of *D. Mercurii* but are otherwise [not different from *D. Sprengelii*.

143. *Dryopteris conformis* (Sod.) C. Chr. Index 258.¶1905. — Fig. 16 b.

Syn. *Nephrodium conforme* Sodiro. Rec. 45. 1883; Cr. vasc. quit. 240. 1893.

Type from Ecuador, leg. SODIRO (Kew!); very typical specimens were collected at Mt. Pifi by A. MILLE (RB).

In texture, habit and size very like *D. Sprengelii*, but lamina throughout shortly pubescent, mostly so on the costæ of both sides but the leaf-tissue of both

surfaces is also minutely hairy and without glands. Stipe long, up to 30 cm to the lowermost pair of glanduliform pinnæ, these in 3—4 very distant pairs and above them 3—4 pairs of auriculiform pinnæ. Larger segments often serrate, linear-oblong or ligulate, 3—4 mm broad with 10—15 pairs of veins that are more distant than in *D. Sprengelii*; basal segments of lower pinnæ not much reduced. Sori very close to the margin; indusium small, hairy, soon falling. Sporangia glabrous.

144. *D. scalaris* (Christ) C. Chr.; Revision nr. 72 fig. 47; Smiths. Misc. Coll. 52: 390.

Area: South Mexico to Costa Rica.

145. *Dryopteris Bonapartii* Rosenstock in Fedde Repert. 7: 303. 1909. — Fig. 16 a.

Type from Ecuador, Mt. Tunguragua, SPRUCE nr. 5254 (RB!).

A most distinct species with long slender pinnæ of thin texture and fully pinnate in the lower half. Evidently a near ally of the preceding species and of *D. Mercurii*, in pubescence and lack of glands resembling *D. conformis*, but basal pinnulæ much reduced, veins more numerous and sori not so close to the margin.

146. *Dryopteris Bradei* Christ, Bull. Soc. bot. Gèneve II. 1: 225. 1909. — Fig. 15 f.

Type from Costa Rica, Irazu, leg. BRADE nr. 245 (R!).

Of this I have seen a single leaf only and I dare not decide with certainty whether it is a good species or not. It is not improbable that it is a thin-leaved form of *D. rudis* or *D. nervosa*.

147. *D. Rusbyi* C. Chr. Smiths. Misc. Coll. 52: 390.

Area: Bolivia.

148. *D. Christensenii* Christ; C. Chr. Revision nr. 70 fig. 46.

Area: Costa Rica, BIOLLEY nr. 67 part. (CC), Candelaria, A. et C. BRADE nr. 418 (R); Panama, Chiriqui, MAXON nr. 5202 bis (W).

149. *D. limbata* (Sw) O. Ktze.; C. Chr. Revision nr. 71; Smiths. Misc. Coll. 52: 390.

Area: St. Kitts, Guadeloupe; Jamaica (?).

D. consanguinea (Fée) C. Chr. (see above nr. 59) may be a small form of this.

150. *D. corazonensis* (Sod.) C. Chr. Revision nr. 57 fig. 36.

Area: Ecuador.

151. *Dryopteris semilunata* (Sod.) C. Chr. Index 291. 1905. — Fig. 16 d.

Syn: *Nephrodium semilunatum* Sodiro Rec. 46. 1883; Cr. vasc. quit. 245. 1893.

Type from Ecuador leg. SODIRO (Kew!).

Stipe to lowest developed pinnæ 50 cm long and bears 3—4 pairs of very distant pairs of glanduliform pinnæ, the lowermost ones not more than 5—6 cm from

the base of the stipe. Pinnæ opposite, coriaceous, like rachis quite glabrous, 10—12 cm long, 2 cm broad, arcuate-ascending, the lower ones at base with a pair of glanduliform free pinnulæ and above them a pair of auriculiform segments, basal segments of medial pinnæ reduced. Segments 5—6 mm broad, acute, falcate, their margins revolute. Veins not very distinct, 10—12-jugate, simple. The specimen seen is sterile; according to SODIRO the sori are near the margin and furnished with a deciduous indusium.

Differs from the allied species (*D. rudis*, *D. piloso-hispida* etc.) by its entirely glabrous leaf and the pale underside.

152. *Dryopteris canelensis* Rosenstock, Fedde, Repert. 7: 302, 1909.

Type from Ecuador, in silva Canelos, SPRUCE (RB!).

A species allied to *D. rudis* but well marked by its short and narrow pinnæ, coriaceous texture, very oblique segments with about 11 pairs of veins and its very tomentose rachis.

153. *D. nervosa* (Kl.) C. Chr., Revision nr. 75.

Area: British Guiana, Costa Rica; Panama, MAXON nr. 4966 (W).

Rizome creeping. Much like a glabrescent form of *D. rudis* and perhaps it should be united with that species.

154. *D. rudis* (Kze.) C. Chr., Revision nr. 73 fig. 48. Smiths. Misc. Coll. 52: 391.

Area: Mexico along Andes to Ecuador and Bolivia. Jamaica (*P. ctenoides* Jenm.).

A widely spread and rather uniform species, of which I have recently received several specimens, f. inst. from Panama, MAXON nr. 5675 (W) and Bolivia, BUCHTIEN nr. 494 (R). It varies mainly in texture and pubescence; generally the whole lamina is rather densely setose by stiff hairs and the costæ beneath are furnished with some brown scales, still the upper surface can be nearly quite glabrous and such specimens are scarcely to distinguish from *D. nervosa* by any other character than the supramedial sori. This more glabrous and generally smaller form is *D. lasiopteris* (Sod.) C. Chr. Revision nr. 69 fig. 45, which I now do not hesitate to reduce to a synonym of *D. rudis*. About the same form, still with fewer (9) veins is

Dryopteris caeca Rosenstock, Fedde, Repert. 7: 302. 1909, from Ecuador, SPRUCE nr. 5261 (RB).

Aspidium subdecussatum Christ, Bull. L'Herb. Boiss. II. 4: 960. 1904.

Dryopteris subdecussata C. Chr. Index 295. 1905.

Costa Rica, ALFARO nr. 16556 (C) is rather typical *D. rudis*.

Aspidium exsudans var. *myriocarpum* Fourn. Mex. Plant. 1: 94 is also, according to specimens in Herb. Mus. Paris so named by FOURNIER, a synonym of the present species.

Aspidium gleichenioides Christ, Bull. L'Herb. Boiss. II. 4: 960. 1904.

Dryopteris gleichenioides C. Chr. Ind. 268. 1905.

Costa Rica, Forêts du Barba, TONDUZ nr. 1935 (C).

In Smiths. Misc. Coll. 52: 395 I referred this to *D. pterifolia*, it is, however, a rather common form of *D. rudis* with the upperside nearly glabrous.

It can scarcely be doubted that the true *Nephrodium tetragonum* Presl. Rel. Haenk. 1: 85. 1825 is the same as *D. rudis*. Unfortunately the original specimen in Herb. Presl (!) is very defective and it may belong to another related species.

155. **D. Engelii** Hieron.; C. Chr. Revision nr. 74.

Area: Venezuela. Colombia.

Additional specimens from Venezuela, FUNCK et SCHLIM and GOLLMER (B), show that rachis and costæ beneath bear several small scales. Lamina with a pair of reduced pinnæ and 2—3 pairs of glanduliform warts.

My new species *D. Pittieri* C. Chr. Smiths. Misc. Coll. 52: 393 from Colombia, PITTIER nr. 1200 (W) I regard now as a very coriaceous form of *D. Engelii* with rather numerous scales along the costæ beneath.

156. **Dryopteris peruviana** Rosenstock, Fedde, Repert. 7: 298. 1909.

Type from Peru, Cerro de Campana, SPRUCE nr. 4655 (RB!).

Very like *D. rudis* in habit, size and pubescence, different by setose sporangia.

157. **Dryopteris Heineri** C. Chr., Fedde, Repert. 6; 380. 1909; Smiths. Misc. Coll. 52: 392 (erroneously as *D. Heimeri*). — Fig. 16 c.

Type from Brazil, São Paulo, Campinas, A. HEINER nr. 540 (Rg).

The only Brazilian representative of the group of *D. rudis* and a very distinct species with setose sporangia.

158. **D. strigifera** Hieron.; C. Chr. Revision nr. 76.

Area: Colombia.

159. **D. Brausei** Hieron.; C. Chr. Revision nr. 77.

Area: Colombia.

160. **Dryopteris piloso-hispida** (Hook.) C. Chr. comb. nov.

Syn. *Nephrodium piloso-hispidium* Hook. spec. fil. 4: 105. 1862.

Dryopteris pterifolia (Mett.) O. Ktze.; C. Chr. Revision nr. 78 fig. 49 with synonymy; Smiths. Misc. Coll. 52: 395.

Alsophila pilosa Mart. et Gal. Mém. Foug. Mex. 78 tab. 22. 1842.

Area: Mexico along Andes to Bolivia.

The original specimen of *N. piloso-hispidium* Hook. from Ecuador, SPRUCE sine num. (Kew!) is exactly what I previously have named *D. pterifolia* and it is absolutely identical with *Alsophila pilosa* Mart. et Gal. according to authentic

specimens in Herb. Mus. Paris. It is perhaps the largest species of the whole subgenus. The receptacle is clothed with some long hairs which are seen between the sporangia and may be mistaken for an indusium.

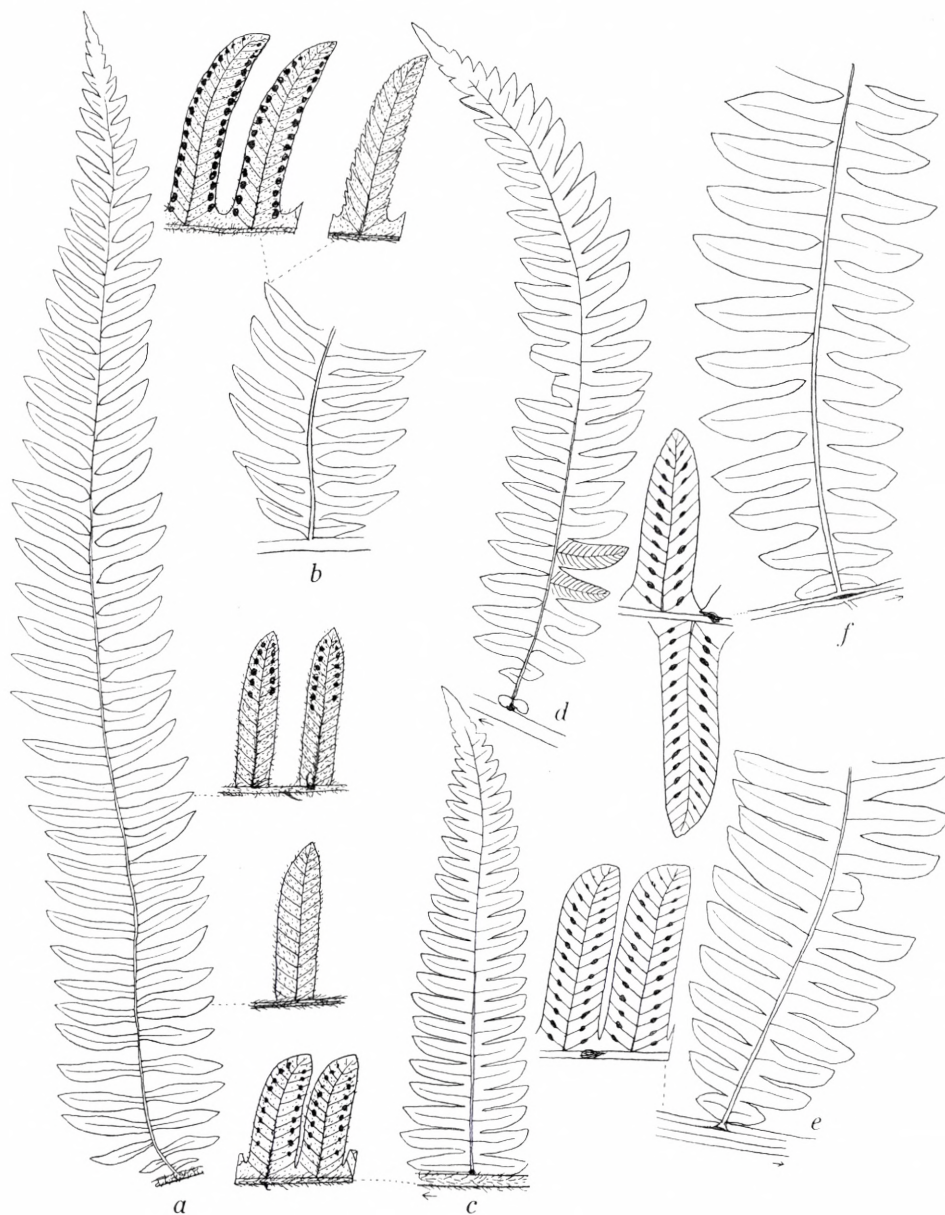


Fig. 16. a. *D. Bonapartii* Ros. (orig.) — b. *D. conformis* (Sod.) C. Chr. (orig.) — c. *D. Heineri* C. Chr. (orig.) — d. *D. semilunata* (Sod.) C. Chr. (orig.) — e. *D. euclora* (Sod.) C. Chr. (orig.) — f. *D. euclora* var. *inaequans* C. Chr. from Nicaragua.
All Pinnæ $\times \frac{4}{5}$, segments $\times 1\frac{1}{2}$, those without sori seen from above.

161. *Dryopteris euchlora* (Sod.) C. Chr. Index 263. 1905. — Fig. 16 e.

Syn. *Polypodium euchlorum* Sodiro, Rec. 58. 1883. Cr. vasc. quit. 290. 1893.

Type from Ecuador, Mt. Pululahua, leg. SODIRO (specim. auth. in Kew!); also Mt. Pichincha, STÜBEL nr. 751 (B).

A very large species with a stipe 60—70 cm long and a lamina of equal length. Rhizome apparently creeping; stipe brownish-stramineous, glabrous and clothed with scattered, adpressed scales, in the upper part bearing 4—5 pairs of tuberculiform, very distant abortive pinnæ. Developed pinnæ numerous, the lowest 1—2 pairs much abbreviated (Type IV), the following alternate at distances of 4—5 cm, the upper ones closer, fresh-green, membranous but thin, very sparsely strigose on the costæ above, otherwise like the straw-coloured rachis quite glabrous, but costæ beneath furnished with small, scattered, deciduous scales. Largest pinnæ up to 20 cm long, 3—3¹/₄ cm broad, the lower ones very contracted at base, incised to a wing 1—2 mm broad. Segments patent, linear, 5 mm broad the apex rounded or subacute and generally faintly toothed, the basal ones of lower pinnæ much reduced, of the upper equal or the anterior one somewhat shortened. Veins 15—18 jugate, simple, not very close. Sori medial, small, exindusiate; sporangia glabrous.

In size, shape of segments, reduction of lamina and contracted base of lower pinnæ allied to *D. piloso-hispida* but very different by thin texture, glabrous frond and medial sori. Together with *D. Glaziovii* it is intermediate between the bipinnatifid species of the group of *D. rudis* and the bipinnate *D. pteroidea*.

D. atropurpurea Hieron. (supra nr. 114) I fear should be referred to *D. euchlora*. It has fewer veins, distinctly crenate segments and atropurpureous rachis, otherwise it is not essentially different.

A Central-American fern, fragments of which I have known for a long time, and which was collected recently by MAXON in Panama, I can now with certainty refer to *D. euchlora* as

var. *inaequans* nov. var. — Fig. 16 f.

Agrees perfectly with the type in size and texture, its practically glabrous frond, reduction of lamina and base of lower pinnæ, that are very remote, in shape of segments, number of veins, etc. It differs from the type by its opposite pinnæ and the segments being often crenate (like those of *D. atropurpurea*), but the main difference is the unequal-sided pinnæ, the basiscop side of which is broader than the acroscop one (2¹/₂ cm and 2 cm in the lower pinnæ) with 15—16 veins to a side in a basiscop segment, 11—13 in an acroscop one. — Rhizome creeping 1¹/₂ cm thick, slightly scaly at the growing apex.

Panama, Canal Zone, humid forests, Chiriqui, 1650 to 1925 m, MAXON nr. 5674 (W).

Nicaragua, Omotépé Island in Lake Nicaragua, U. S. North Pacific Exploring Expedition 1853—56 (W).

By its unequal-sided, very distant, opposite pinnæ this variety looks very diffe-

rent, but I cannot consider it specifically distinct. STÜBEL's nr. 751 from Ecuador shows to some extent the same peculiarities and even in the authentic specimen of the type one can find a difference of some few millimeters between the length of the segments of the upper and lower side of the lower pinnæ.

162. *D. Glaziovii* Christ; C. Chr. Revision nr. 62 fig. 40,

Area: Brazil, Minas Geraes and Rio.

Since the publication of my Revision I have seen the type-specimen of this species, GLAZIOU nr. 5267 (C) and specimens from Minas Geraes, Itacolumi, 1400 m, SCHWACKE nr. 14109 (C). In these specimens the veins are simple and the basal segments not free; the stipe bears 3—4 pairs of glanduliform pinnæ. Our specimen (H) has furcate veins and the lower segments often quite free, thus belonging to a more divided form that like the preceding species has the basiscop side of the pinnæ enlarged. But the species can be much more divided, fully bipinnate or even tripinnatifid. The bipinnate form with simple or furcate veins is

Gymnogramme patula Fée, Cr. vasc. Brés. 1: 59 tab. 14 fig. 3 1869.

Serra os Orgaos, GLAZIOU nr. 2822 (H); Serra de Ouro Preto, SCHWACKE nr. 15022 (C). FÉE's figure is as a whole excellent, but the lower pinnulæ should be reduced gradually. This form is closely allied to the Andine *D. pterioidea* to which species BAKER in Flor. bras. referred it; it differs by the sori being placed not so close to the margin and not being confluent. Unfortunately I have not seen the base of the lamina, but if I am right in considering it a form of *D. Glaziovii* it very likely has the lower pinnæ abortive and glanduliform.

A still more cut form has the pinnulæ deeply lobed and the veins pinnatifid in the lobes; this is

Gymnogramme expansa Fée, Cr. vasc. Brés. 1: 60 tab. 14 fig. 4. 1869.

Another specimen of GLAZIOU's nr. 2822 (H) agrees perfectly with FÉE's figure; it is sterile.

Comparing Fée's two figures with that of mine we see here a series of forms quite corresponding to those of *D. multiformis*.

While the bipinnatifid forms of the last two species, *D. euchlora* and *D. Glaziovii* certainly are related to *D. piloso-hispida* the species are, on the other hand, also and perhaps more intimately related to the bipinnate *D. pterioidea*. Together with this they belong to a separate little group of large species of rather thin texture, and dark colour. Most species belonging here have a nearly entirely glabrous frond, opposite and sessile pinnæ, which are narrowed towards their base, where a distinct aërophore is to be found. *D. euchlora* stands next to *D. piloso-hispida* and resembles not a little the bipinnatifid form of *D. Glaziovii* while the more cut forms of this latter species are closely allied to the two following species, which are, as it seems, constantly bipinnate. They represent the highest development of cutting in the subgenus, at least as far as American species are concerned.

163. *Dryopteris pterioidea* (Kl.) C. Chr. Index 287. 1905.

Syn. *Polypodium pterioideum* Klotzsch, Linnaea **20**: 389. 1847; Hook. spec. fil, **4**: 255 tab. 280.

Phegopteris pterioidea Mett. Aspid. u. Pheg. nr. 3. 1858.

Type from Colombia, MORITZ nr. 291 and KARSTEN nr. 40 (B!)

HOOKEER'S figure represents very well this characteristic species, still the lower pinnulæ are generally much more reduced than shown in HOOKEER'S plate. It varies mainly in size and cutting; I have seen specimens with pinnæ 50 cm long and pinnulæ 5—7 cm long by 1 cm broad. The pinnulæ vary from being fully entire or faintly crenate to deeply lobed especially at the middle. Texture membranous, colour dark-green, surfaces (the sparsely setose costæ excepted) glabrous rachis slender, sparsely and deciduously pilose. Veins generally once furcate bearing the small, exindusiate sori just within the margin; in lobed pinnulæ the veins are pinnately branched. — I have not seen rhizome and stipe; I believe that the rhizome is creeping and METTENIUS says (l. c.) that the lower pinnæ are abbreviated or abortive.

Colombia, KARSTEN nr. 40, MORITZ nr. 291, LINDIG nr. 157, STÜBEL nr. 478 a et 687 (B), SCHLIM nr. 3681 (C).

Venezuela, FUNCK et SCHLIM nr. 491 (C).

Ecuador, SPRUCE nr. 5260, STÜBEL nr. 894 (B).

164. *Dryopteris cochaensis* n. sp.

Syn. *Dryopteris biserialis* Hieron. Hedwigia **46**: 343. 1907, non C. Chr.

Type from Colombia: Cocha, leg. STÜBEL nr. 231 (B!)

D. pterioideae magnitudine, habitu, textura, colore valde similis, differt: rachi rachillisque dense setosis, pinnis supra ubique minute pubescentibus, soris fere medialibus.

I think this can safely be distinguished from *D. pterioidea* by the characters pointed out above. It is certainly very closely related to the former species, very much resembling large forms of it. Pinnæ 35—45 cm long; pinnulæ 4 cm long by $\frac{1}{2}$ cm broad, broadly sessile (in *D. pterioidea* generally subauriculate), the lower ones gradually reduced, central ones the largest and more or less lobed especially in the middle. Veins furcate or pinnate in the lobes, black and pellucid, bearing the round or oblong exindusiate sori just above the furcation at a considerable distance from the edge.

Prof. HIERONYMUS identified the only specimen of this new species with *D. biserialis* (Bak.) C. Chr. BAKER'S species however is a member of the subgenus *Ctenitis* and, of course, totally different from our species. This is a new instance of the impossibility of determining specimens with certainty after Syn. Fil.

165. *Dryopteris Ruiziana* (Kl.) C. Chr. comb. nov.

Syn. *Polypodium Ruizianum* Klotzsch, Linnaea **20**: 385. 1847.

Type from Peru, ad Panatahua, leg. RUIZ nr. 70 (B!).

This was founded on a fragment, the upper part of a leaf, but I have no doubt that it is a very distinct species allied to *D. multiformis* and that its proper position is here.

Rachis stramineous, trisulcate above with light brown scales in the furrows, scarcely pubescent. Pinnæ opposite, 15 cm long, 2¹/₂ cm broad, coriaceous, glabrous above (the sparsely setose costa excepted), margins, costæ and costulæ beneath rather densely soft-hairy by very long, thin, whitish, pluricellular, patent hairs and with several light-brown thin scales. Segments rather close, linear-falcate, obtuse, the basal ones reduced and auricled at the inner side. Veins simple, 15—17-jugate. Sori about medial, exindusiate.

166. *D. lanipes* C. Chr. Smiths. Misc. Coll. 52: 394.

Area: Guatemala.

167. *D. horrens* Hieron.; C. Chr. Revision nr. 80.

Area: Ecuador.

168. *D. mertensioides* C Chr. Revision nr. 81 fig. 50.

Area: Costa Rica; Guatemala: San Miguel Uspantán, Depart. Quiché, 6000 ft., HEYDE et LUX ed. DONN. SMITH nr. 3243 (W).

The specimens quoted have indusiate sori.

169. *D. cheilanthoides* (Kze.) C. Chr. Revision nr. 82 fig. 51;
Smiths. Misc. Coll. 52: 396.

Area: Southern Brazil. Jamaica. Mexico along Andes to Peru.

The Andine forms of this most distinct species do not agree perfectly with the Brazilian type, still I can not make them a separate species. The differences are only small; perhaps the most constant is the presence of an auricle on the inner side of the lower basal prolonged segments, which overlaps the rachis above; in the Brazilian form this auricle is very small or absent. As to pubescence and glandulosity the Andine forms are somewhat variable. They have been described under several names, but I cannot see any clear difference between the forms, and I refer them all to a single variety:

var. *resinoso-foetida* (Hook.).

Syn. *Nephrodium resinoso-foetidum* Hk. spec. fil. 4: 105. 1862.

(Ecuador, SPRUCE nr. 5300, Kew! RB; nr. 5299 and 5301 quoted by HOOKER I refer to *D. pachyrachis*).

Lastrea grossa Presl, Epim. 41. 1851. nomen. (Mexico, LEIBOLD, hb. Presl!).

Aspidium Kunzei Fée, 10 mém. 37 tab. 41 fig. A, B.

Dryopteris oochlamys C. Chr. Ind. 280. 1905.

Aspidium decrescens Kze.; Mett. *Aspid.* nr. 202. 1858.

Dryopteris decrescens O. Ktze.; C. Chr. *Ind.* 261. (Venezuela, FUNCK & SCHLIM nr. 1229, L!)

Nephrodium atomiferum Sod. *Rec.* 48. 1883. (Ecuador, SODIRO, Kew!)

Nephrodium Sprengelii var. *persicinum* Jenm. *Journ. Bot.* 1879: 261. (Jamaica!)

Dryopteris cheilanthoides var. *eglandulosa* C. Chr. *Bull. L'Herb. Boiss.* II. 7: 262. 1907.

Dryopteris supina var. *Biolleyi* Christ, *Bull. L'Herb. Boiss.* II 7: 262. 1907; C. Chr. *Revision* 308.

170. *Dryopteris multiformis* n. sp. — Fig. 17.

Ecuador, in præruptis montis Pichincha, 3000 m., leg. A. MILLE (RB!).

Rhizomate oblique erecto, parce squamoso. Stipitibus subfasciculatis, strictis, griseo-stramineis basi fusciscentibus, sulcatis glabris, squamis brunneis sparse onustis, 15—25 cm longis. Lamina ovato-lanceolata, ad apicem pinnatifidum sensim decrescente, versus basin subito attenuata, 40—70 cm longa, 10—30 cm lata, firmo-herbacea vel membranacea, opaca, griseo-viridi, valde variabili: bipinnatifida-bipinnata-tripinnatifida, subglabra vel dense pubescente, rachi costis costisque utrinque pilis albidis tenuissimis, longis, pluricellularibus, patentibus plus minusve hirtis, marginibus ciliatis, faciebus glabris, costis subtus squamis parvis nonnullis instructis. Pinnis semper oppositis, sessilibus, infimis 2—3 paribus valde reductis, auriculiformibus, sequentibus 2—3 paribus parum abbreviatis, reflexis, medialibus maximis, recte patentibus, inter se 3—4 cm remotis, oblongis vel lanceolatis, acuminatis, plus minusve partitis, segmento vel lacinia basali posteriore semper aucto, falcato, basi auriculam rachin tegentem ferente. In eadem planta formæ sequentes repertæ sunt: 1) forma bipinnatifida, dense pilosa (fig. 17 a—b); pinnis 6—8 cm longis, $1\frac{1}{4}$ —2 cm latis, ad alam 2 mm latam pinnatifidis; lacinis acutis, subfalcatis, marginibus integris revolutis; venis simplicibus, 6—7-jugis. 2) forma bipinnatifida major subglabra (fig. 17 c—d); pinnis ad 20 cm longis, 3 cm latis, ad alam 3 mm latam pinnatifidis; lacinis acutis, subfalcatis, marginibus subintegris, vix revolutis; venis simplicibus, 10—12-jugis. 3) forma bipinnata vel tripinnatifida subglabra (fig. 17e); pinnis ad 20 cm longis medio ad 6 cm latis, versus basin attenuatis, a basi ad medium pinnatis, a medio ad apicem pinnatifidis; pinnulis ad costam late adnatis, subremotis, basi utrinque auriculatis, auriculis ovatis acutis, sursum integris vel plus minusve profunde lobatis; pinnula basali anteriore reducta, venis in pinnulis maximis ad 16-jugis, plerumque furcatis vel subpinnatis. — Soris medialibus exindusiatis, sporangiis glabris.

This remarkable species is certainly closely allied to *D. cheilanthoides*; the second form described above resembles very much the large Mexican form of *D.*

cheilanthoides described as *Aspidium Kunzei* Fée (*Lastrea grossa* Pr.), but it differs by its medial, exindusiate sori, fewer veins and eglandulose underside. The bipin-

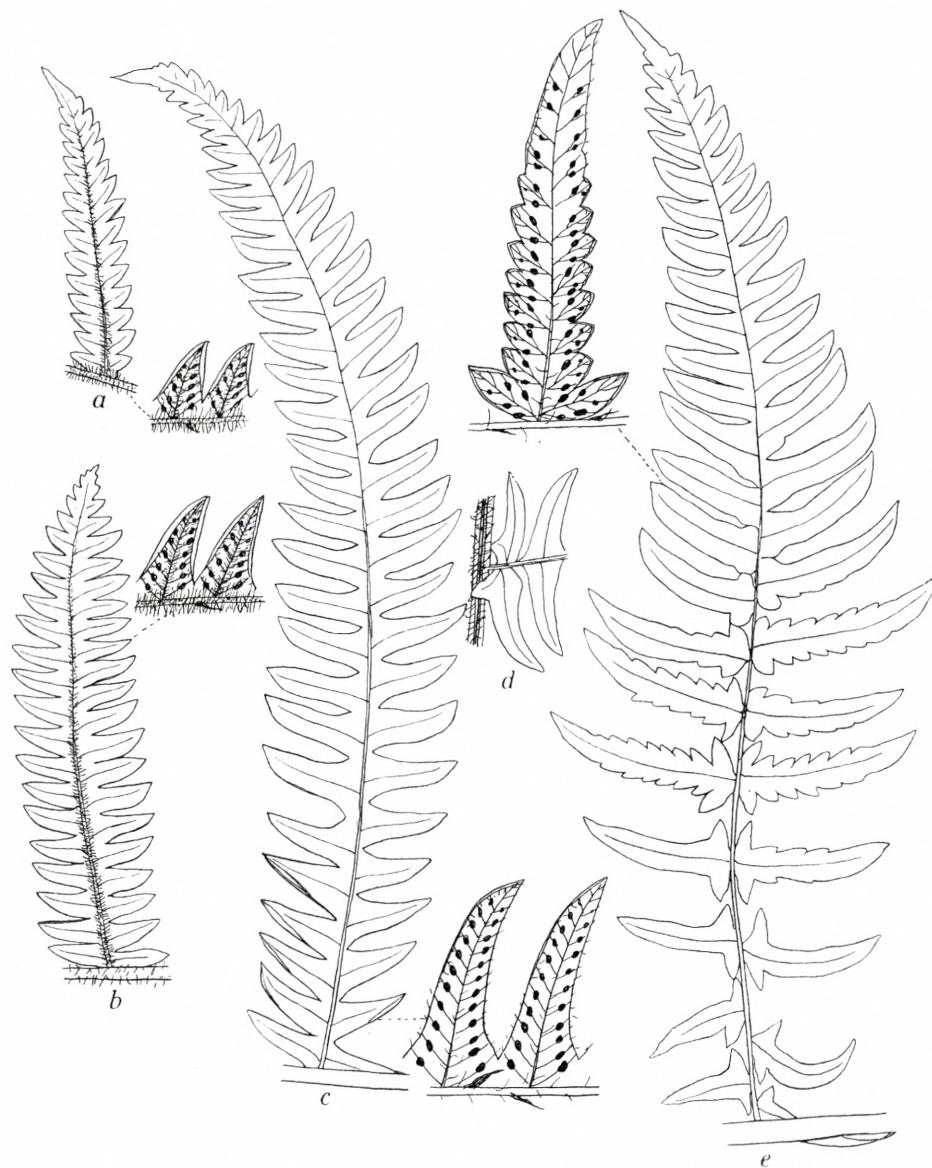


Fig. 17. *D. multiformis* n. sp. The middle pinna of four different leaves of the same plant, $\times \frac{4}{5}$ with segments $\times 1\frac{1}{2}$ (orig.).

nate form resembles in habit not a little *D. pteroidea* differing by the not reduced, auricled lower basal segment, pubescence, position of sori. The two species are, I believe, very remotely related.

Unknown species of *Lastrea*.

The following species, of which I have seen no specimen, can with approximate certainty be referred to the present subgenus.

1. *Aspidium Fischeri* Mett. *Aspid* nr. 192. 1858; *Dryopteris Fischeri* C. Chr. Ind. 266. — Brazil. — Closely allied to *D. ptarmica*.
2. *Phegopteris leptoptera* Fée, Gen. Fil. 244. 1850—52. — San Domingo, DE TUSSAC. According to the description this has setose sporangia. Most likely it is identical with *D. concinna*.
3. *Aspidium sanctoides* Fée, Gen. 292. — Guadeloupe, DUCHASSAING. — In Ind. Fil. referred to *D. opposita*. FÉE compares it to *D. sancta*.
4. *Aspidium confluens* Fée, Gen. 293. — South America, PAMPLIN nr. 75. Fully indeterminable from the description alone.
5. *Aspidium pachychlamys* Fée, 11 mém. 77 tab. 21 fig. 2. 1866. — Guadeloupe, L'HERMINIER. — A form of *D. opposita*?
6. *Nephrodium rigescens* Sodiro, Cr. vasc. quit. 239. 1893; *Dryopteris rigescens* C. Chr. Ind. 289. — Ecuador, Corazon. — Near *D. cheilanthoides*?
7. *Nephrodium elegantulum* Sodiro, Cr. vasc. quit. 243. 1893; *Dryopteris elegantula* C. Chr. Ind. 263. — Ecuador, valle de Pallatanga. — ? —
8. *Nephrodium longipilosum* Sodiro, Sertula Florae Ecuad. series II. 26. 1908 — Ecuador, Corazon. — May be a very hairy form of *D. oligocarpa*.
9. *Nephrodium cinereum* Sodiro. l. c. — Ecuador, Corazon, a variety β *intermedium* from Esmeraldas. A short-hairy species like *D. concinna*, but indusium persistent.
10. *Nephrodium basiattenuatum* Jenman, Gard. Chron. March 17th. 1894; Bull. Bot. Dept. Jamaica n. s. 3: 20. 1896; *Dryopteris basiattenuata* C. Chr. Ind. 254. — Jamaica, Mount Moses. — Probably near *D. sancta*. — According to Miss SLOSON this is apparently not in JENMAN'S type-herbarium in New York Bot. Garden, and it was also not found in Kew.
11. *Nephrodium crenulaeum* Jenman, Bull. Bot. Depart. Jamaica n. s. 3: 68. 1896; *Dryopteris crenulaea* C. Chr. Ind. 259. — Jamaica. — ? — Not in JENMAN'S type-herbarium and not in Kew.
12. *Dryopteris Hassleri* Christ, in Bull. l'Herb. Boiss. II. 7: 922. 1907. — Paraguay, HASSLER nr. 9056 a.
13. *Dryopteris Rojasii* Christ in Fedde, Repert. 6: 349. 1909. — Paraguay, HASSLER nr. 10514 a.
14. *Lastrea Cumingiana* Pr. Epim. 37, 1849. — Chile, CUMING.

Subgenus 5. *Glaphyopteris* (Presl) C. Chr.

Biolog. Arbejder tilegnede Eug. Warming p. 80. 1911.

Glaphyopteris Presl, Abhandl. böhm. Ges. Wiss. V. 5: 344, 1848.

A small subgenus of mostly large species with a bipinnatifid lamina and an often very large (1 cm or more long), acute aërophore at the bases of the pinnæ beneath and similar but smaller aërophores at the bases of the midribs of the segments (not found in *D. mapiriensis*)¹.

Segments close, rectangular with broad, bluntly rounded apex and entire margins, rarely the apex is acute. Veins very close and numerous, simple, the basal ones reaching the margins above sinus. Pubescence somewhat variable (see below), the under-surface of most species covered with numerous, sessile, red glands, which are deciduous and therefore not found in older specimens.

By these characters the six species referred to *Glaphyopteris* differ from *Lastrea*, but I fear that the characters mentioned are not sufficient for the segregation of the two proposed subgenera. If one should prefer to treat *Lastrea* as a genus, which would be a very natural treatment, *Glaphyopteris* ought to be referred to it as a subgenus. It is true that the typical species of *Glaphyopteris*, *D. decussata*, is very different from all species referred to *Lastrea*, but it is no doubt intimately related to the three first species mentioned below. These three species show both the characters of *Lastrea* and *Glaphyopteris* besides some others peculiar to them alone; with the same right they could be referred to *Lastrea*, to a proper subgenus or to *Glaphyopteris*. I prefer here to refer them to a proper section of *Glaphyopteris*, which they are perhaps nearest related to. The subgenus thus is divided into two groups each including three species:

1. Group of *D. Thomsonii*. The three species belonging here resemble species of *Lastrea*, especially those related to *D. rudis*, by the shape of the lamina, which is abruptly narrowed downwards with 3—4 pairs of glanduliform warts along the stipe, and further by the shortly and antrorsely setose costæ above; the veins are not so close as in the species of *Glaphyopteris* proper, which they resemble by the presence of aërophores at the base of the midribs beneath.

The pubescence of the costæ beneath (partly also of the rachis) is peculiar and different from all species of *Lastrea* and *Eu-Glaphyopteris*. The costæ beneath are, namely, shortly and often densely cinereo-tomentose by sessile, 2—3-branched hairs, which do not resemble the stalked, branched hairs of *Goniopteris*. Further the sori seem to be indusiate at least in *D. Cañadasii* and *D. macradenia*. The three species belonging here were in my former papers referred to the group of *D. opposita*. ("Revision" nr. 67, 68 and 79).

¹ The most important function of the aërophores or better "pneumatophores" appears to be during the development of the leaf, while the growing parts of this are covered by mucilage. Very likely they are provisions for the aeration of the young parts; in the developed leaf they are shriveled. See BOWER, Annals of Botany 24: 427—428, foot-note, 1910.

2. Group of *D. decussata* (*Glaphyopteris* proper). Lamina not narrowed downwards and without glanduliform pinnæ. Still I find along the stipe of a specimen named *Polypodium Percivalii*, which is no doubt a form of *D. decussata*, several long, projecting aërophores which certainly indicate the place of non-developed pinnæ. Rachis and costæ beneath finely downy by short, simple hairs that are deciduous; costæ above and margins very characteristically villous by long, soft hairs. Veins very close and numerous. Sori exindusiate.

Glaphyopteris is probably confined to tropical America. I do not know any Old-World's species which can safely be referred hereto. The Himalayan *D. erubescens* (Wall.) C. Chr. is similar in habit but otherwise quite different.

Key.

1. Lamina with 3—4 pairs of small, tuberculiform, abortive pinnæ along the stipe. Costæ above antrorsely setose, beneath cinereo-tomentose by sessile, branched hairs. Veins 15—20-jugate, not very close.
 2. Under surface not glandular. Indusium present, but rarely seen.
 3. Sori medial or inframedial. Segments broadly obtuse, membranous, shortly and rigidly setose above 171. *D. Cañadasii* (Sod.) C. Chr.
 3. Sori supramedial. Segments acute, coriaceous, the upperside (costæ and veins excepted) glabrous 172. *D. macradenia* (Sod.) C. Chr.
 2. Under surface densely glandular 173. *D. Thomsonii* (Jenm.) C. Chr.
1. Lamina without auriculiform and glanduliform, abortive pinnæ. Costæ above and margins villous by long, soft hairs; rachis and costæ beneath glabrous or more or less downy by simple hairs. Veins very close.
 2. Veins about 16-jugate. No aërophore at the base of the costules beneath. Texture thin, herbaceous 174. *D. mapiriensis* Ros.
 2. Veins 25—60-jugate. Distinct aërophore at the base of the costules. Texture firm to coriaceous.
 3. Veins 25—40-jugate. Under surface densely glandular. Sori inframedial 175. *D. decussata* (L.) Urb.
 3. Veins 45—60-jugate. Under surface apparently eglandulose. Sori supramedial 176. *D. polyphlebia* n. sp.

171. *Dryopteris Cañadasii* (Sod.) C. Chr.; Revision nr. 68 fig. 44.

Area: Ecuador. — SODIRO describes the species as exindusiate; I have failed to find indusia in authentic specimens.

172. *Dryopteris macradenia* (Sod.) C. Chr.; Revision nr. 79.

Area: Ecuador, SODIRO (authentic specimens in C and Kew!)

Closely related to the preceding species, but the lamina coriaceous, the segments acute and the sori supramedial. Basal segments much reduced.

173. *Dryopteris Thomsonii* (Jenm.) C. Chr.; Smiths. Misc. Coll. 52: 389.

Syn. *Dryopteris Stübelii* Hieron., C. Chr. Revision nr. 67.

Area: Jamaica, Colombia; Ecuador, Llalla, SPRUCE nr. 5651 (Kew, L, RB).

174. *Dryopteris mapiriensis* Rosenstock, Fedde, Repert. 6: 315. 1909. — Fig. 18.

Type from Bolivia: San Antonio prope Mapiri, 800 m, BUCHLIEN nr. 1131 (R!). A most distinct species, different from the allied *D. decussata* by its small size, fewer veins, densely villous rachis and costæ, thin texture and lack of aërophores at the base of the costules.

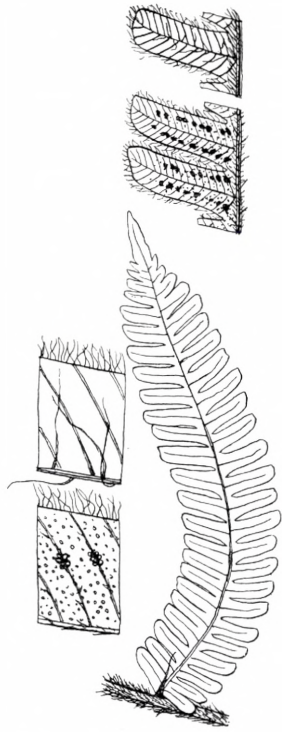


Fig. 18. *D. mapiriensis* Ros. — Pinna $\times \frac{4}{5}$; two segments from the underside and one seen from above, $\times 1\frac{1}{2}$; fragments seen from both surfaces $\times 4$. (orig.)

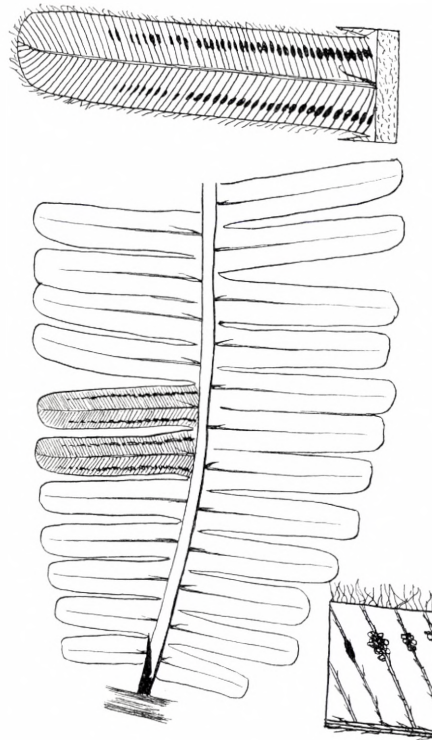


Fig. 19. *D. polyphlebia* n. sp. Portion of pinna, $\times \frac{4}{5}$; segment $\times 1\frac{1}{2}$ and fragment $\times 4$.

175. *Dryopteris decussata* (L.) Urban, Symb. Antill. 4: 19. 1903; C. Chr. Ind. 261.

Syn. *Polypodium decussatum* L. sp. 2: 1093. 1753; Jenm. Bull. Bot. Dept. Jamaica n. s. 4: 130. 1897. (for other synonyms see Ind. Fil.).

Polypodium grammicum Spr. Neu. Entd. 3: 6. 1822!

Gymnogramme microcarpon Fée, 7 mém. 43 tab. 20 fig. 5. 1857.

Polypodium velutinum Sod. Rec. 59. 1883; Cr. vasc. quit. 292. 1893!

Polypodium Percivalii Jenm.; Bak. Ann. of Bot. 5: 456, 1891!

Dryopteris Percivalii C. Chr. Ind. 284. 1905.

LINNAEUS founded this well-known species on "Petiv. fil. 61 t. 2 f. 5", a work to which I have no access, but all later authors quote also PLUMIER tab. 24, which plate illustrates a plant from Martinique and which is our species.

A very large species with fronds up to 3¹/₂ m long and pinnæ 30–45 cm long by 4 cm broad. Stipe strong, generally muricate, scaly below and like the rachis downy by short, simple, deciduous hairs; in some (or all?) specimens the stipe bears some long, projecting aërophores. Margins and costæ above densely hairy by long, soft hairs, costæ and costulæ beneath slightly and shortly pubescent becoming glabrous; under-surface covered with red, sessile, deciduous glands. Pinnæ sessile, linear with nearly parallel edges, the aërophore at base thorn-like, 1 cm long. Segments patent, 2 cm long, 3–4 mm broad with an obliquely rounded apex, i. e. the posterior side being bluntly rounded, the anterior one forming about a right angle with the anterior edge, a threadlike aërophore, 2–3 mm long, is found at the base of the costules beneath; basal segments generally somewhat reduced. Veins 25–40-jugate, very close. Sori inframedial or subcostular, exindusiate: receptacles somewhat elevated, oblong; sporangia glabrous, reddish, loose.

The form described here is the typical one, to which belong the following specimens:

West-Indian Islands: Martinique, ISERT (H); SIEBER nr. 189, 349 (B = *P. grammicum* Spr.); L. HAHN nr. 41 (B) — Guadeloupe, L'HERMINIER nr. 173 (B, C); LENORMAND (B); DUCHASSAING (B) — Montserrat, RYAN (H) — Dominica, EGGERS nr. 629 (B); F. E. LLOYD nr. 349 (W) — St. Vincent, EGGERS nr. 6805 (W); H. H. & G. W. SMITH nr. 43 (W) — Grenada, EGGERS nr. 6388 (C, W); BROADWAY (W) — Porto Rico, SINTENIS nr. 1787 (C), 4592 (B, W) — Jamaica, H. SMITH nr. 436 (B); HART nr. 195 (W); CLUTE nr. 163 (W); A. FREDHOLM nr. 3343 (W); UNDERWOOD nr. 1361 (W).

Guiana, LEPRIEUR (B, W) — Mt. Russell, Pomeroon River, Demarara, JENMAN nr. 2080 (Kew = *P. Percivalii* Jenm.),

Venezuela, FUNCK nr. 771 (B); KARSTEN nr. 166 (B).

Costa Rica, La Palma, MAXON nr. 443 (W); WERCKLÉ (C, CC).

Most Andine specimens differ from the type by the more densely pubescent rachis and costæ, more remote and more acute segments and apparently fewer glands on the underside.

A specimen from SODIRO, named by himself *P. velutinum* Sod. belongs to this form, which I therefore call

f. *velutina* (Sod.)

Ecuador, SODIRO (C) — Peru: San Gavan, LECHLER nr. 2356 (B).

Costa Rica: La Palma, TONDUZ nr. 12639 (C, W) — Carillo, PITTIER et TONDUZ nr. 1165 (C).

var. *brasiliensis* n. var.

A typo differt: stipite spinis acutis instructis; rachi costisque subtus pilis longis patentibus vestitis.

All the Brazilian specimens seen differ from the type by these two characters; otherwise they fully agree.

Brazil: Sta. Catharina, Joinville, O. MÜLLER (R) — SCHWACKE nr. 13320 (C) — Am Rio Comprido bei Ignape, WETTSTEIN u. SCHIFFNER IX. 1901 (Herb. Mus. Wien).

176. *Dryopteris polyphlebia* n. sp. — Fig. 19.

Syn. *Polypodium decussatum* Sod. Cr. vasc. quit. 291. 1893.

Type from Ecuador, leg. SODIRO (B, type specimen, C).

I agree with SODIRO in considering this species distinct from *D. decussata*, which SODIRO described as a new species (*P. velutinum*). It resembles it in most characters but may be distinguished by the following

Very large (I have not seen a complete frond); pinnæ up to 45 cm. long by 7 cm broad with the costa beneath more than 2 mm broad. Pinnæ oblong-elliptical or lanceolate, shortly stalked and narrowed towards the base, in the specimens seen without glands. Segments close with parallel edges, their apex equally rounded to both sides, $3\frac{1}{2}$ cm long by 7 mm broad; veins 50–60 to a side. Sori a little above the middle of the vein, oblong. — Texture coriaceous, fragile, colour grey-green; rachis 8 mm broad, castaneous as young very finely puberulous, soon glabrous.

Besides the specimens from Equador I have seen the following from Costa Rica: Carillo, PITTIER nr. 2474 (B, C, W) — Talamanca, TONDUZ nr. 9453 (C, W).

Subgenus 6. *Steiropteris* C. Chr.

Biolog. Arbejder tilegnede Eug. Warming pag. 81. 1911.

Rhizome wide-creeping, ligneous, scaly at the apex; scales firm, castaneous or dull-brown, entire but generally with some few short, acute hairs on the margins. Lamina deltoid or somewhat narrowed below, rarely (in *D. deltoidea*) with several pairs of auriculiform pinnæ, firm to rigidly coriaceous, of a characteristic greyish or brownish colour, more or less pubescent by simple hairs, which partly are short and unicellular, partly long and pluricellular. In most species both kinds of hairs are found intermixed on rachis and costæ beneath, in others only one kind is found; seldom the leaf is quite glabrous. Lamina pinnatifid, or, as a rule, bipinnatifid with sessile or shortly stalked pinnæ, in most species with a distinct acute aërophore at the base. Veins simple, often raised above, those of the basal pair running out to the sinus, more or less connivent and with a cartilagineous

membrane between them; this membrane is in leaves of thick texture often folded and forms on the underside an often hairy keel running from the sinus towards the costa and parallel to the costules. Indusium in most species large, reniform, as a rule persistent. Sporangia glabrous.

A natural group including 13 known species of middle-size or large-grown and partly closely related to each other. The majority of them resemble in habit not a little *D. rudis* and allied species, in venation, indusium and rhizome *D. oligophylla*; the subgenus thus connects the two groups of which the two species named are typical members. From both it can be distinguished by the characteristic carinate fold below the sinus, the grey colour and the pluricellular hairs. From the free-veined species of *Goniopteris* all species are different by the lack of stellate hairs. Glands are absent in all species.

The two last species, *D. glandulosa* and *D. Fendleri*, are somewhat different from the others. Their position in this subgenus is doubtful; see below.

Key.

1. Pinnæ sessile or the lower ones very shortly stalked. All veins free.
 2. Lamina pinnatifid (or pinnate below only) with entire segments
177. *D. Wrightii* (Mett.) O. Ktze.
 2. Lamina bipinnatifid.
 3. Lower pinnæ more or less reduced.
 4. Lamina suddenly narrowed downwards with several pairs of auriculiform, reflexed pinnæ 178. *D. deltoidea* (Sw.) O. Ktze.
 4. Lower pinnæ abbreviated but not auriculiform.
 5. Lamina membranous-papyraceous, pinnæ incised to a narrow wing to costa 179. *D. L'Herminieri* (Kze.) C. Chr.
 5. Lamina rigidly coriaceous; pinnæ incised about halfway to the costa 180. *D. lonchodes* (Eat.) O. Ktze.
 3. Lower pinnæ not reduced, generally reflexed.
 4. Without aërophore. Lamina rather thin.
 5. Rachis and costæ beneath with many short hairs with some few long, pluricellular hairs intermixed. Pinnæ incised to a wing 3—5 mm broad; veins 9—10-jugate
181. *D. densiloba* C. Chr.
 5. Rachis, margins, costæ and veins beneath with many very long, pluricellular hairs, short hairs few. Pinnæ incised nearly to costa; veins 10—11-jugate
182. *D. incana* (Christ) C. Chr.
 4. Aërophore present. Lamina firm, membranous or papyraceous.
 5. Fronds dimorphous. Stipe and rachis very densely clothed

- with woolly, long, pluricellular hairs, under which is a layer of short hairs..... 186. *D. valdepilosa* (Bak.) C. Chr.
5. Sterile and fertile fronds similar. Long hairs few or none.
6. Pinnæ incised to a narrow wing to the costa; segments rarely 6 mm broad.
7. Pinnæ with unequal base, i. e. the lower basal segment shorter than the upper
179. *D. L'Herminieri* (Kze.) C. Chr.
7. Basal segments equal and often very reduced in the lower pinnæ. Indusium persistent.
8. Leaf-tissue of both surfaces finely pubescent. Rachis and costæ with several long hairs. Sori medial 183. *D. Leprieurii* (Hk.) O. Ktze.
8. Leaf-tissue glabrous. Costæ beneath glabrous or short-hairy.
9. Veins raised above. Sori submarginal
184. *D. praetervisa* (Kulm.) O. Ktze.
9. Veins scarcely raised above. Sori subcostular
185. *D. densisora* C. Chr.
6. Pinnæ incised to a wing 5—8 mm broad; segments 7—9 mm broad 187. *D. insignis* (Mett.) O. Ktze.
1. Most pinnæ distinctly stalked, scarcely incised halfway down to the costa; segments 6—8 mm broad; lower 2—6 veins on the same side of the costule united along a cartilagineous membrane or keel below the sinus, thus forming 2—4 areoles on each side of the costule. Long, pluricellular hairs none. Lamina upwards suddenly narrowed into a hastate, terminal pinna.
2. Indusium very small, rarely seen; 3—4 pairs of lower veins connivent to the membrane or keel..... 188. *D. glandulosa* (Desv.) C. Chr.
2. Indusium persistent, glabrous, 6 pairs of connivent veins
189. *D. Fendleri* (Eat.) O. Ktze.

177. *Dryopteris Wrightii* (Mett.) O. Ktze. Rev. 2: 814, 1891; C. Chr. Ind. 301.

Syn. *Aspidium Wrightii* Mett.; Eaton, Mem. Amer. Acad. n. s. 8: 210. 1860.

Nephrodium Wrightii Hk. sp. 4: 64 tab. 239. 1862; Hk. Bak. Syn. 288;

Jenmann, Bull. Dept. Jam. n. s. 3: 142. 1896.

Type from Cuba orient., Monte Verde, WRIGHT nr. 824 (S), and collected in the same region by MAXON nr. 4482 (W). — JENMANN has found the species in Jamaica, but I have seen no specimens.

A very distinct species, which by authors generally is placed near *D. scol-*

pendrioides, but it agrees in all characters with the other species of § *Steiropteris*, and we here come upon an excellent illustration of the unnatural manner of arranging the species after the degree of cutting. HOOKER's plate cited above is a good figure of the species, and it is unnecessary to give here a new description. Aërophore is not present. It differs from all pinnatifid species of *Dryopteris* by the characters ascribed to § *Steiropteris* and from the other species of this group by its pinnatifid, not bipinnatifid lamina.

178. *Dryopteris deltoidea* (Sw.) O. Ktze. Rev. 2: 812. 1891. C. Chr. Ind. 261.

Syn. *Polypodium deltoideum* Sw. Prod. 133. 1788 — (for other synonyms see Ind. Fil.).

Type from Jamaica; leg. SWARTZ (S! H).

A well-known species, which is the type species of § *Steiropteris*. The pinnæ of the lower half of the lamina are reduced to mere lobes, which are reflexed and auricled at the base.

St. Thomas: Le Dru (H).

Porto Rico: EGGERS nr. 814 (B, C), SINTENIS nr. 1001 (S), 2411 (B), 2033, 2256, 2873 (C) — Ventenat (H).

Jamaica: MAXON nr. 915 (H W.), 2907 (C, W).

Cuba: WRIGHT nr. 823 (B, S) — PALMER and RILEY nr. 506 et 1028 (H).

Trinidad: Don (L).

179. *Dryopteris L'Herminieri* (Kze.) C. Chr. Ind. 275. 1905.

Syn. *Aspidium L'Herminieri* Kunze; Mett. Aspid. 85 nr. 285. 1858.

Aspidium trichophorum Fée, 11. mém. 81 tab. 23 fig. 2. 1866.

Nephrodium trichophorum Bak. Syn. 265. 1867; Jenman, W. Ind. and Guiana Ferns 215.

Dryopteris trichophora O. Ktze. Rev. 2: 814; C. Chr. Ind. 298.

Aspidium asperulum Fée, 11. mém. 80 tab. 23 fig. 1. 1866.

Dryopteris decumbens C. Chr. Ind. 261. 1905.

Aspidium Capitainei Fée et L'Herm.; Fée, 11. mém. 80 tab. 22 fig. 3. 1866.

Nephrodium Holmei Bak. Ann. Bot. 5: 317. 1891.

Dryopteris Holmei C. Chr. Ind. 271. 1905.

? *Nephrodium clypeolutatum* Desv. Prod. 258. 1827.

Type from Guadeloupe, leg. L'HERMINIER (B!).

A distinct species resembling in size and general habit *D. mollis* and *D. normalis*, but really a near ally of *D. deltoidea* and *D. Leprieurii*, showing all the characters of § *Steiropteris*:

The wide-creeping rhizome is clothed at the apex with brown scales, which are lighter and thinner than those of *D. deltoidea* and *D. lonchodes*. The stipe is 15—20 cm long, glabrous or finely pubescent. Lamina 2½—4 cm long, 12—15 cm broad, slightly narrowed downwards, membranaceous, grey-green or brownish. Rachis, costæ and both sides and costules beneath densely villous by short, uni-

cellular and long, pluricellular hairs, the margins and veins above with solitary long setæ. Aërophore large, acute, hairy (as in *D. deltoidea*). Lower pinnæ more or less reduced, seldom equal to the next pair, sessile or very shortly stalked. Pinnæ alternate, about 8 cm long by 1½ cm broad, the apex acute or acuminate, the base unequal-sided, truncate on the upper, cuneate on the lower side, incised to a narrow wing 1—2 mm broad into falcate or oblique, entire or faintly crenate, acute segments, 4 mm broad. Upper basal segment generally a little longer and almost parallel to rachis, the lower (especially in the lower pinnæ) shorter and oblique. Veins 7—8-jugate, simple, the basal ones running out to the sinus or a little above it with a hyaline, hairy membrane or (in dried specimens) a distinct keel between them. Sori supramedial, furnished with a large, reddish, persistent indusium, which is glabrous or more often pubescent by short hairs and a few long, deciduous setæ.

D. L'Herminieri, with which *A. trichophorum* Fée is absolutely identical, is a fairly constant species, mainly varying in pubescence. *A. Capitainei* Fée is a form with a glabrous indusium and without long, pluricellular hairs on rachis and veins above, but the rachis and costæ beneath are more densely tomentose by the short hairs; to this form belong all specimens from St. Vincent and Grenada, while the specimens from Guadeloupe are partly this form partly typical. *N. Holmei* Bak. is the typical form and *A. asperulum* Fée is intermediate between the two extremes. According to a note in Herb. Berol. by METTENIUS *Nephrodium clypeolutatatum* Desv. is this species; if so the name of course has priority. — The species seems to be confined to the Lesser Antilles, from which I have seen the following specimens. METTENIUS mentions a specimen from Jamaica, leg. BREUTEL, which I have not seen, and JENMANN does not know the species as Jamaican. The Brazilian specimens referred hereto by BAKER in Fl. bras. belong to *D. lugubris*.

St. Kitts: BRITTON and COWELL nr. 398 (W).

Montserrat: RYAN (H); HOLME (Kew = *N. Holmei* Bak.).

Guadeloupe: L'HERMINIER (B, hb. FÉE, Paris) — MAZÉ nr. 40 (C), JENMAN (W), Père DUSS nr. 4044, 4405 (W).

Dominica: EGGERS nr. 898 (W); F. E. LLOYD nr. 23 et 754 (W).

Martinique: Père DUSS nr. 1583, 1584 (W) — BORDAZ (C).

[St. Lucia: GRAY according to JENMAN, not seen.]

St. Vincent: JENMAN (W), EGGERS nr. 6883 (C, W), CHECKLEY nr. 10 (C) — Herb. Bot. Gard. Trinidad nr. 6182 (C).

Grenada: SHERRING nr. 222 (W); MURRAY and ELLIOTT (B, W); EGGERS nr. 6102 (C, W), JENMAN (W), BROADWAY nr. 3767 (RB).

180. *Dryopteris lonchodes* (Eat.) O. Ktze. Rev. 2; 813. 1891; C. Chr. Ind. 275. — Fig. 20.

Syn. *Aspidium lonchodes* Eaton, Mem. Amer. Acad. n. s. 8: 210. 1860.

Nephrodium lonchodes Hk. sp. 4: 99. 1862; Hk. Bak. Syn. 270.

Type from Cuba orient. Monte Verde, WRIGHT nr. 1007, 1008 (B, S, W) — Specimens from the same region (Vicinity of Baracoa) were collected by POLLARD, E. and W. PALMER nr. 239 (W).

Closely allied to the two preceding species, distinguished by its rigid, grey frond, which upwards is suddenly narrowed into a long pinnatifid apex. Scales of rhizome dark-castaneous, rigid. Pubescence mainly as in *D. L'Herminieri*, still the

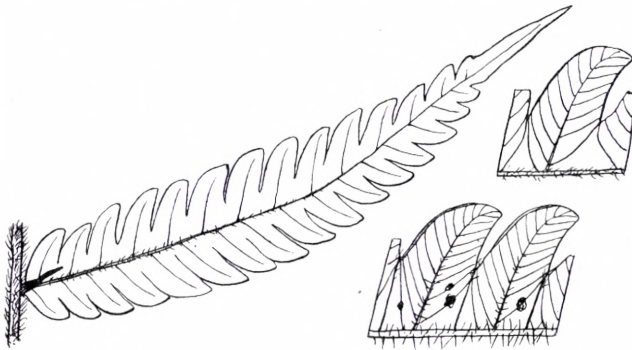


Fig. 20. *D. lonchodes* (Eat.) O. Ktze. Pinna $\times 4\frac{1}{5}$; two segments from the underside and one from the upper side, $\times 1\frac{1}{2}$.

costæ beneath are lacking the short hairs, and the upper side hairy on the costæ only. Pinnae sessile with an equal, cuneate base, incised $\frac{1}{2}$ — $\frac{2}{3}$ of the way to the costa into falcate, obtuse or acute lobes. Veins about 10-jugate occasionally forked, raised on the upper side; the basal ones connivent to the sinus; keel distinct. Sori medial, rather small, with a reddish, persistent, slightly setose indusium. — The pinnae are few, 6—8 to a side, the lower

ones more or less abbreviated; middle ones 10—15 cm long, 2—2 $\frac{1}{4}$ cm broad.

181. *Dryopteris densiloba* C. Chr. Index 261. 1905. — Fig. 21 a.

Syn. *Nephrodium Gardnerianum* Bak. Fl. bras. 1²: 474. 1870; Syn. Fil. 496.

Dryopteris Gardneriana O. Ktze. Rev. 2: 812. 1891.

Dryopteris supralineata Rosenst. in Fedde, Repert. 8: 277. 1910.

Type from Brazil, Organ Mts., GARDNER nr. 190 (Kew!). Other specimens were collected near Rio by GLAZIOU nr. 15760 (B, H) and OHANS (R), and in the state of São Paulo, Serro da mar, WACKET nr. 212 (R = *D. supralineata* Ros.).

D. densiloba is apparently a rare species, closely related to *D. L'Herminieri*, resembling it in size, colour and pubescence. It is of a thinner texture and without aërophore; lower pinnae not conspicuously reduced, reflexed, the upper ones with a characteristic upcurved apex; pinnae less incised, the often very close, acute segments being connected by a wing 3—5 mm broad; the keel distinct but not reaching the costa. Veins 9—16 to a side; sori medial or a little above the middle of the vein; indusium persistent, shortly pilose (not glabrous as described by BAKER). — The basal segments of the lower pinnae are much reduced.

182. *Dryopteris incana* (Christ) C. Chr. Ind. 272. 1905.

Syn. *Aspidium incanum* Christ, Hedwigia 44: 367. 1905.

Type from Amazonas: Puritisa, Juruá Miry, Rio Juruá, E. ULE. Herb. Bras. Amazonas Exp. nr. 5763 (C!).

A critical species of doubtful position; provisionally I place it in this section, because it in colour and pubescence best agrees with the other species. Still it lacks aërophores, and the rhizome is described as erect; the vein-like keel is inconspicuous but present. From the nearest species, *D. Leprieurii*, it differs further by its thin texture, much reduced lower segments of the lower pinnæ, and pubescence, stipe, rachis, costæ on both sides being long-hairy by patent, grey, pluricellular hairs with a few short hairs intermixed. Segments linear, somewhat oblique, acute, connected by a very narrow wing; veins 10—11-jugate; sori small, medial, with a small, short-hairy indusium.

183. *Dryopteris Leprieurii* (Hook.) O. Ktze. Rev. 2: 813. 1891;
C. Chr. Ind. 274. — Fig 21 c.

Syn. *Nephrodium Leprieurii* Hk. sp. 4: 106. 1862; Hk. Bak. Syn. 266; Jenman, W. Ind. and Guiana Ferns 216.

Type from French Guiana, LEPRIEUR (Kew! specim. auth. also in B and W).

The typical form of this species is closely related to *D. L'Herminieri*, differing from it by its non-reduced lower pinnæ and the basal segments of lower pinnæ being considerably reduced; also it is much larger, lamina $1/2$ — $3/4$ m long by $2^{1/2}$ —3 dm broad, the opposite pinnæ 12—15 cm long, $2^{1/2}$ —3 cm broad. In pubescence it agrees with *D. L'Herminieri*, still the leaf-tissue of both surfaces is finely pubescent by adpressed hairs. Veins 10—12-jugate, raised above, the basal ones reaching the margin a little above the sinus; keel inconspicuous in some specimens, distinct in others. Sori medial, indusium large, more or less hairy.

JENMAN (l. c.) describes the rhizome as being erect; unfortunately all the specimens from Guiana seen by me want rhizome, but in the Brazilian specimens are found parts of the rhizome, which appears to have been creeping with scattered leaves.

D. Leprieurii is apparently a very variable species, at least if the specimens referred to it really belong to a single species. Even the specimens from Guiana vary not a little, and some of them belong perhaps to *Nephrodium subfuscum* Bak. Syn. Fil. 267. 1967; Jenman, W. Ind. and Guiana Ferns 217; *Dryopteris subfusca* O. Ktze., C. Chr. Ind. 295 from Cayenne, LEPRIEUR, which I cannot distinguish from *D. Leprieurii* from the descriptions alone. JENMAN says that it is intermediate between *N. Leprieurii* and *N. stipulare* (= *D. patens*). The type-specimen of it was not found in the Kew Herbarium.

Besides the authentical specimens of *D. Leprieurii* I have seen some others from Guiana, f. inst.: Demerara, JENMAN (W); Maraval, Bot. Gard. Herb. Trinidad nr. 335 (W). Further I refer here some specimens from Brazil and the central South American Andes, which probably belong to var. β Hook. spec. 4: 106. They differ from the typical form by more numerous veins (16—18 to a side), more deeply incised pinnæ (wing 1— $1^{1/2}$ mm broad), large fronds ($3/4$ —1 m long,

30—40 cm broad), glabrous leaf-tissue and less pubescent ribs; keel inconspicuous or absent, but then a broad, cartilaginous membrane is seen between the basal veins. Sori medial, indusium glabrous or finely pubescent.

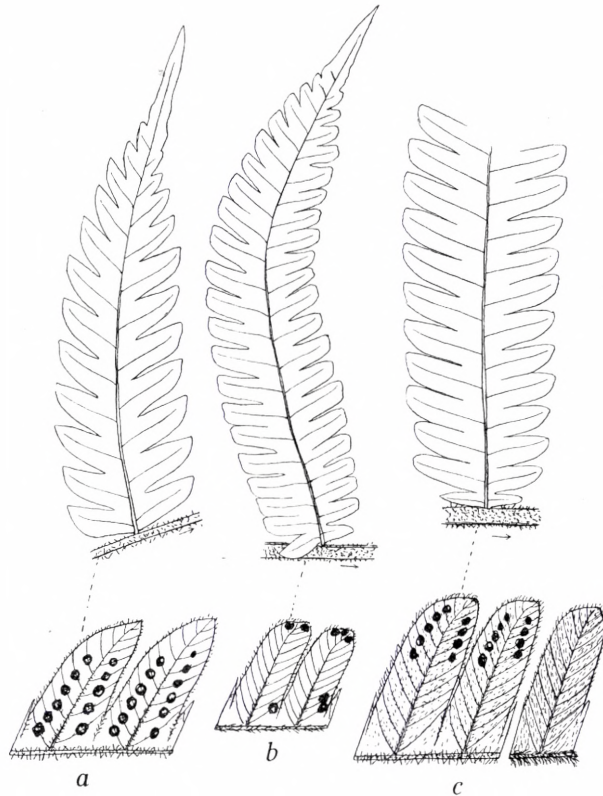


Fig. 21. a. *D. densiloba* C. Chr.; b. *D. praetervisa* (Kuhn) O. Ktze.; c. *D. Leprieurii* (Hook.) O. Ktze.; all from the type-specimen. Pinnæ $\times \frac{4}{5}$, segments $\times 1\frac{1}{2}$.

Type from Venezuela, Tovar, FENDLER nr. 371 (Kew!).

A critical species and perhaps a variety of *D. Leprieurii*. It differs from that species by the perfectly glabrous leaf-tissue, the costæ and costulæ only being sparsely setose by short hairs; rachis rather densely but shortly pubescent. Veins 10—12-jugate, much raised above. Keel distinct beneath but not reaching the costa. Sori supramedial, sometimes close to the margin, in the only specimen seen confined to the lower two anterior veins and to two or three upper veins at the apex of the segment. — Lamina firm, papyraceous, glossy above, very gradually narrowed upwards into a long-acuminated apex. This last character is perhaps the most marked one. Aërophores distinct.

Having not seen two specimens, which are quite identical, and not being able of distinguishing the forms from *D. Leprieurii* by several characters, I prefer to refer all the specimens hereto, although it is very probable that at least some of them belong to a distinct species.

Brazil: Matto Grosso, Santa Anna da Chapada, MALME $\frac{4}{8}$ 1902 (Rg. — very beautiful and large specimens with very acuminate pinnæ) — Minas Geraes: Lagoa Santa, WARMING (H).
Bolivia: Mapiiri, RUSBY nr. 426 (CC, thin leaved; sori supramedial).
Peru: St. Gavan, LECHLER nr. 2468 (B).

var. *minor* Hieron. Hedwigia 46: 328. 1907.

Ecuador, in valle Pastaza, Stübel nr. 965 (B).

184. *Dryopteris praetervisa* (Kuhn) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 285. — Fig. 21 b.

Syn. *Aspidium praetervisum* Kuhn, Linnaea 36: 111. 1869.

Nephrodium praetervisum Bak. Syn. Fil. 495. 1874.

185. *Dryopteris densisora* C. Chr. Ind. 261. 1905.Syn. *Aspidium costale* Mett., Kuhn, Linnaea 36: 111. 1869.*Nephrodium costale* Bak. Syn. 495. 1874.

Type from Venezuela, FENDLER nr. 476 (not seen, not found at Kew). Although I have not seen an authentic specimen I do not hesitate to refer to this species several specimens from Costa Rica, which exactly correspond to the original description. Most of these specimens I have previously determined as *D. Leprieurii* var. *palmensis* (Christ) considering them not specifically different from *D. Leprieurii* and using a MS name of Dr. CHRIST for the variety.

D. densisora is very closely allied to *D. Leprieurii* and it is perhaps only a variety of it. It differs by the glabrous surfaces, being sparsely strigose along the costæ only, and especially by the *inframedial* or subcostular sori, which are furnished with a very large, subbullate and subglabrous indusium. Veins about 12-jugate, scarcely raised above. As to all other characters it agrees with *D. Leprieurii*.

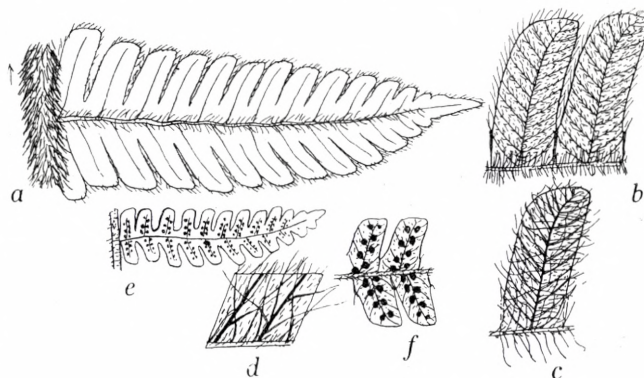
Costa Rica: La Palma, TONDUZ nr. 12576 (C, W), WERCKLÉ (C, CC), A. et C. BRADE nr. 347 (R).

Panama: MAXON nr. 5605 (W).

186. *Dryopteris valdepilosa* (Bak.) C. Chr. Ind. 299. 1905. — Fig 22.Syn. *Nephrodium valdepilosum* Bak. Journ. Bot. 1881: 204.

Type from Colombia, province of Antioquia, KALBREYER nr. 1347 and 1871 (Kew!), and very typical specimens were collected in Costa Rica by J. J. COOPER (W).

A most distinct species, remarkable by its stipe and rachis being very densely clothed with long, soft, patent light brown, pluricellular hairs; similar hairs but shorter and fewer are found on the costæ, costulæ and veins of both sides. These long hairs are (as seen in nr. 1871) deciduous and under them is a rather dense layer of very short, unicellular hairs; costæ above also with many long but antrorse hairs; leaf-tissue of both surfaces pubescent by minute adpressed hairs. Fronds dimorphous, if the fertile frond of nr. 1347 really belongs to the same plant as the sterile one. Sterile lamina on a stipe 20 cm long, lanceolate, 40–50 cm long, 15–20 cm broad at the middle, membranous, greyish green. Pinnæ close, sessile, lower ones much reflexed, scarcely



D. valdepilosa (Bak.) C. Chr. (KALBREYER 1347). a. pinna of sterile leaf $\times \frac{4}{5}$; b. two segments from the underside and c. one segment seen from above of the same pinna, $\times 1\frac{1}{2}$; d. fragment of the same from the upper side $\times 4$; e. pinna of fertile leaf $\times \frac{4}{5}$; f. segments of the same, $\times 1\frac{1}{2}$.

reduced, central ones about 10 cm long, $2\frac{1}{2}$ cm broad, shortly acuminate, a distinct aërophore at the base beneath, incised to a wing 4–5 mm broad into close oblong segments, which are as broad at the rounded apex as at the base. Veins 10–12, keel distinct. — Fertile lamina much narrower, 20 cm long by 8 cm broad; pinnæ distant, obtuse, 3– $3\frac{1}{2}$ cm long, 1 cm broad, incised nearly to costa. Sori near costule, furnished with a persistent, long-ciliated indusium.

D. valdepilosa is intermediate between *D. Leprieurii* and *D. insignis*, abundantly different from both by its dimorphous fronds and woolly pubescence of stipe and rachis.

187. *Dryopteris insignis* (Mett.) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 272.

Syn. *Aspidium insigne* Mett. Ann. sc. nat. V. 2: 247. 1864.

Nephrodium insigne Bak. Syn. 262. 1867.

Type from Colombia, TRIANA (B, where only a pair of basal pinnæ is to be found).

A true *Steiropteris*, by HIERONYMUS unrightly identified with *D. brachyodus* (Hedwigia 46: 323). It differs from the other species of the subgenus by its entirely glabrous pinnæ, which are only incised $\frac{1}{2}$ — $\frac{2}{3}$; keel very distinct; segments 7–8 mm broad; veins 12–16-jugate, prominent, sori medial, small. Texture firm, membranous, colour grey.

A hairy form of this species is no doubt *Dryopteris lata* Hieron. Hedwigia 46: 327. 1907, from Ecuador, in valle Pastaza, STÜBEL nr. 999 part (B!). It differs by its strigose costæ and veins beneath and the caudate apex of the pinnæ. HIERONYMUS identified it with *Lastrea lata* J. Sm. a name attributed to CUMING pl. philipp. nr. 266, which certainly came from the Philippine Islands. I have seen authentic specimens of CUMING nr. 266 in herb. PRESL and they differ from *D. lata* Hieron. *inter alia* by the stalked pinnæ. I agree with BAKER in considering *L. lata* J. Sm. a form of *D. crassifolia* (Bl.) O. Ktze.

The following two species are as to several characters very different from the species of *Steiropteris* dealt with above, still I think their proper place must be in this subgenus, although it is not improbable that they belong to a proper subgenus. In general aspect they resemble much more species of *Goniopteris* f. inst. *D. nicaraguensis* and *D. megalodus*, and at first I referred them to that subgenus. They differ, however, from *Goniopteris* and agree with *Steiropteris* in the presence of distinct aërophores and in pubescence, stellate hairs being entirely wanting, rachis and costæ beneath are very finely pubescent by minute, simple hairs, which do not differ from the short, unicellular hairs of most species of *Steiropteris*. Long pluricellular hairs of the common kind do not occur, but the costæ and costulæ beneath are more or less furnished with narrow, brown fibrils, which are scale-like hairs consisting of a single row of cells; such fibrils are often found in large

number round the aërophore and at base of the costules and have here fully the aspect of scales. These "scales" are, however, not true scales; under the microscope they are seen to consist of an entangled mass of the long, brown fibrils, probably brought together by mites and thus forming *Acarodomatia*, but not very much resembling those common on the leaves of *Tilia*. — Very remarkable and quite unique is the venation. Below the sinus extends to the costa a cartilaginous membrane, which in dried specimens often is folded and form a keel quite as in the preceding species; the pinnæ being incised scarcely to the middle the lower 4–6 pairs of veins run out to the membrane, and those coming from the same side of the costule are united near the edge of the membrane into a common-vein running along the membrane to the sinus (see fig. 23). — Other peculiarities of the two species are the not deeply cut, stalked pinnæ and the subdistinct terminal pinna.

188. *Dryopteris glandulosa* (Desv.) C. Chr. comb. nov., non O. Ktze.¹⁾

Syn. *Polypodium glandulosum* Desv. Berl. Mag. 5: 317. 1811.

Goniopteris abbreviata Presl, Tent. 183. 1836 (nomen).

Phegopteris abbreviata Mett. Pheg. nr. 45. 1858.

Phegopteris Plumieri J. Sm. Bot. Voy. Herald 228. 1854.

Goniopteris rostrata Fée, 11 mém. 64 tab. 17 fig. 3. 1866 (bona!)

Nephrodium brachyodon auctt. quoad pl. Ind. occ.; Jenman, W. Ind. and Guiana Ferns 235.

Nephrodium dejectum Jenman, Gard. Chron. III. 18: 640. 1895; W. Ind. and Guiana Ferns 241.

Dryopteris dejecta C. Chr. Ind. 261. 1905.

Type from the West-Indies without exact locality (Herb. DESVAUX, Mus. Paris!).

A most distinct species, very well described by METTENIUS and JENMAN (loc. cit.) and well figured by FÉE. It can at once be distinguished from *D. megalodus*, with which it often has been confounded, by its coriaceous texture, yellowish or greyish underside, its falcate lobed, its simple not stellate hairs of the costæ beneath and by the presence of aërophores and scale-like fibrils on the costæ beneath. Further *D. megalodus* and related species have a terminal pinna like the lateral ones, while the terminal pinna of *D. glandulosa* is hastate, i. e. below its broad base and often confluent with it are to be found a pair of short, lateral pinnæ; the next following pair of pinnæ are much larger.

Rhizome 2–3 cm thick, ligneous, short-creeping, naked. Stipe often 60–80 cm long, stramineous, deeply sulcate above, glabrous. Lamina 30–60 long with 8–10 pairs of very remote (6–8 cm), opposite pinnæ, up to 25 cm long by 4 cm broad, distinctly stalked with a prominent dark, acute or obtuse aërophore beneath,

¹⁾ *D. glandulosa* (Bl.) O. Ktze. = *Aspidium glandulosum* Bl. 1828 must subsequently be renamed. I propose for it the new name *Dryopteris malayensis* C. Chr.

the apex caudate, the base of lower pinnæ reduced; lower pinnæ not shortened. Rachis slender, finely downy by minute hairs, soon glabrous. Pinnæ above slightly strigose on the deeply channelled costæ, elsewhere glabrous, the generally flat costæ and costulæ beneath microscopically puberulous, by simple hairs, the leaf-tissue glabrous. Scale-like fibrils of the costæ beneath few and scattered. Pinnæ incised scarcely to the middle into broad, falcate, entire segments. Veins simple, 12—16-jugate, the lower 3—4 forming areoles between the costule and the membrane; sometimes those of the basal pair are truly anastomosing (*nervatio Goniopteridis*). Sori small, medial or somewhat inframedial. I have failed to find an indusium, which JENMAN describes as small and ciliate. Sporangia glabrous.

DESVAUX identified PLUMIER's plate 21 with this species and was no doubt right; *Ph. Plumieri* was based on the same plate. *D. glandulosa* is in its typical form a common fern in the Lesser Antilles. JENMAN records it also from Jamaica and Guiana. *Nephr. dejectum* Jenm. is according to a photograph of JENMAN's original specimen kindly sent me by Miss SLOSSON together with a small fragment of the same not to distinguish from the type. JENMAN describes the rhizome as erect and the sori as indusiate. — I have seen the following specimens:

West-Indian Islands: St. Kitts, BRITTON and COWELL nr. 407 (W); Mrs. ROBINSON (B) — Montserrat, RYAN (H, RB); H. R. HOLME (B). — Guadeloupe, L'HERMINIER (B, C); Père DUSS nr. 4110, 4112 (W) — Dominica, EGGERS nr. 767 (B, C, RB) — Martinique, ISERT (H); BÉLANGER (RB); HAHN nr. 36 (B, RB), nr. 1075 (B); Père DUSS nr. 1656, 1585 (W); SIEBER, Syn. Fil. exs. nr. 168 (B) — (Santa Lucia, t. JENMAN, not seen) — St. Vincent, EGGERS nr. 6741 (W); H. H. and G. W. SMITH nr. 451 (B, C) — Grenada, SHERRING nr. 103 (C, W) — Tobago, EGGERS nr. 5823 (C); BROADWAY (RB) — Trinidad, Bot. Gard. Herb. Trin. nr. 34 (W); BROADWAY nr. 2524 (RB).

Demerara, JENMAN (*N. dejectum* Jenm.).

Nephrodium Grayii, Jenman, W. Ind. and Guiana Ferns 235 1908 from St. Lucia, GRAY nr. 17, is, judging from the description, this species.

In Central America and South-American Andes a plant occurs, which perhaps is specifically different from *D. glandulosa* but which I now regard as a variety of this species. It is

var. **brachyodus** (Kunze).

Syn. *Polypodium brachyodus* Kze. Linnaea 9: 48. 1834.

Phegopteris brachyodus Mett. Pheg. nr. 38. 1858.

Dryopteris brachyodus O. Ktze.; C. Chr. Ind. 255.

Phegopteris Seemanni J. Sm. Bot. Voy. Herald 228 tab. 49. 1854.

Type from Peru: Pompayaco, leg. POEPPIG (not seen).

In pubescence, size, cutting and venation scarcely different from *D. glandulosa* type; it differs mainly by its thinner texture, darker upperside, alternate pinnæ and its less falcate lobes. The costæ and costules beneath are more decidedly fibrillose by red-brown fibrils, which often cover the aërophore. METTENIUS found the difference between this variety and the type in the goniopteroid venation of

the latter (his *Ph. abbreviata*), but this difference does not exist constantly. In the type one can find occasionally the basal veins truly anastomosing as in *D. megalodus*, what never is the case in the variety.

Guatemala: Cubilquitz. Alta Verapaz, v. TÜRCKHEIM ed. DONN. SMITH nr. 8813 (W); BERNOULLI et CARIO nr. 272 (C); vicinity of Cacao, H. S. BARBER nr. 168 and 170 (W).

Costa Rica: Vicinity of Turrialba, MAXON nr. 175 (W); forêts de Tsâki, Talamanca, TONDUZ nr. 9476 (C, W); Tuis, PITTIER nr. 11292 (C); WERCKLÉ (C).

Panama: MAXON nr. 5774 (W).

Colombia: Sta. Marta, H. H. SMITH nr. 2690 (C).

In Syn. Fil. 295 *Nephrodium brachyodus* is said to occur also in Malayan Peninsula and Isles. I have seen several specimens from the former locality determined at Kew, but they belong all to a species, which in pubescence and venation is totally different. It is figured by BEDDOME (Ferns brit Ind. Suppl. tab. 379) and is probably an undescribed species belonging to *Cyclosorus*.

189. *Dryopteris Fendleri* (Eaton) O. Ktze. Rev. 2: 812. 1891;
C. Chr. Ind. 264. — Fig. 23.

Syn. *Aspidium Fendleri* Eaton, Mem. Amer. Acad. n. s. 8: 210. 1860.

Nephrodium Fendleri Hook. spec. 4: 82. 1862; Bak. Syn. 295.

Type from Venezuela, Tovar leg. FENDLER nr. 372 (B, and a photograph of EATON's specimen in W!)

Closely related to *D. glandulosa*, with which it agrees in size, cutting and texture, opposite pinnæ, pubescence, presence of aërophores and brown fibrils on costæ beneath and in its hastate, terminal pinna. The main differences are 1) the stramineous costæ and costulæ and light-green surfaces, 2) the supramedial sori, which are furnished with a corrugated, glabrous indusium, and 3) the larger number of veins, about 6 to each side of the costule, running to the cuneate, cartilagineous membrane, which upwards is nearly 1 mm broad.

JENMAN referred *D. Fendleri* to *D. venusta* (Bull. Bot. Dept. Jamaica n. s. 3: 188). *D. venusta* is, however, not at all related to the present species, easily distinguished from it by venation, pinnatifid apex, stellate pubescence and other characters.

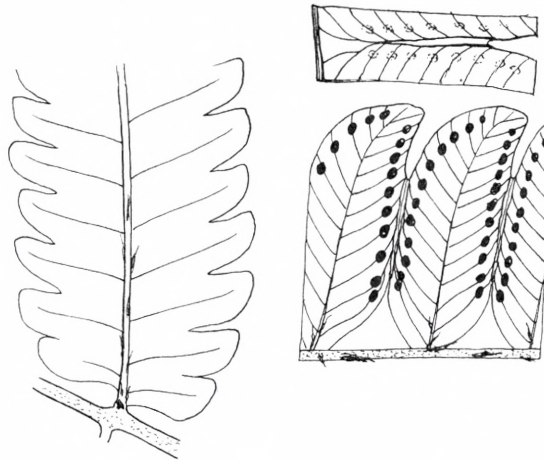


Fig. 23. *D. Fendleri* (Eat.) O. Ktze. Portion of pinna $\times \frac{4}{5}$; segments $\times 1\frac{1}{2}$ and fragment showing the venation below the sinus as seen from the upper side $\times 1\frac{1}{2}$ (orig.).

Subgenus 7. *Cyclosorus* (Link) C. Chr.

Biolog. Arbejder tilegnede Eug. Warming pag. 81. 1911.

The American species of this subgenus are all bipinnatifid and closely related to each other. The rhizome is erect or creeping, clothed with lanceolate or ovate, as a rule hairy and entire scales. Lamina with a broad base or shortly narrowed downwards. Aërophore none; under-surface often glandular, especially on the ribs. Most species rather pubescent by simple, unicellular hairs, only in some few species the longest hairs consist of 2—3 cells, or some of the hairs of the rachis are forked from the very base (f. inst. in certain forms of *D. oligophylla*). In some species rachis and the costæ beneath bear some few minute, lanceolate scales, which often bear long hairs along the edges. Veins simple, the basal ones either connivent to sinus, where they meet or more often are separated by a cartilagineous membrane that can protrude between the segments as a projecting apophysis, or truly united in the leaf-tissue and sending a branch to the sinus. Sori often large, indusiate. Indusium reniform, generally persistent and pilose, often also glandular. Sporangia glabrous (*D. Martini* excepted, which see).

Cyclosorus is allied to *Lastrea* and *Steiropteris*. Its best characters are venation, non-decrescent lamina and large, persistent indusia. In America it is represented by a dozen species, most of which are very variable and connected by intermediate forms. The subgenus is as a whole the most difficult to deal with and several of the species can be distinguished from each other by certain characters, which can not be explained by words or figures but which are easily observed by the trained eye. Two of the species, *D. mollis* and *D. gongyloides*, are not exclusively American but widely distributed in the Old-World, where the subgenus is richly developed.

Key.

Lamina pinnate only, see *D. pusilla* nr. 54 under § *Lastrea*.

Lamina bipinnatifid:

1. Basal tertiary veins free or connivent to sinus, not normally united in the leaf-tissue.
2. Rhizome erect. Rachis not scaly.
 3. Basal scales broad, thin, yellowish or brown, as a rule glabrous. Lower pinnæ not reduced. Basal segments both prolonged and parallel to rachis 190. *D. patens* (Sw.).
 3. Basal scales narrow-acuminate, ferruginous, glossy, hairy. Lower pinnæ somewhat reduced. Basal segments (at least the posterior one) not conspicuously prolonged.
 4. Pinnæ 4—6 cm long by 1 cm broad, rather firm. 191. *D. Goedenii* Ros.

4. Pinnæ 15—20 cm long by 2—2¹/₂ cm broad, thinly herbaceous 199. *D. urens* Ros.
2. Rhizome creeping.
3. Rachis not or very indistinctly scaly. Basal scales ferruginous, narrow-acuminate, as a rule hairy.
4. Lower pinnæ not shortened.
 - 5- Basicop lower segments of lower pinnæ not or slightly reduced. Pinnæ seldom more than 10—15 cm long, 2 cm broad; veins 6—10-jugate.
 6. Veins not prominent beneath. Lower pinnæ not narrowed towards their base. No scales on rachis and costæ 192. *D. normalis* C. Chr.
 6. Veins more or less prominent beneath. Lower pinnæ more or less narrowed towards their base. Rachis and costæ beneath often with small hairy scales.
 7. Lamina herbaceous or membranous without a distinct terminal pinna. Veins not close.
 8. Underside decidedly pubescent. Cuba and Central America 193. *D. augescens* (Lk.) C. Chr.
 8. Underside practically glabrous. Argentina and Paraguay 194. *D. Berroi* C. Chr.
 7. Lamina coriaceous with a distinct terminal pinna. Veins close, the lower 4 connivent to sinus. Pinnæ generally long and narrow 195. *D. serra* (Sw.) O Ktze.
 5. Basicop lower segments of lower pinnæ abortive or perfectly obsolete. Pinnæ up to 50 cm long by 3—4 cm broad. Veins 15—20-jugate, the lower 2—4 connivent to sinus 196. *D. oligophylla* Maxon.
4. Lower pinnæ shortened. Leaf throughout much hairy. Lamina firm often coriaceous. Habit of *D. patens*. 198. *D. Bangii* C. Chr.
5. Lamina thinly herbaceous, the hairs burning. Habit of *D. mollis* 199. *D. urens* Ros.
3. Rachis and stipe densely scaly 197. *D. Tuerckheimii* (Donn. Smith) C. Chr.
1. Basal tertiary veins normally united in the leaf-tissue, sending an ex-current branch to the sinus.
2. Sporangia glabrous. Aërophore none. No veins connivent to sinus.
3. Rhizome oblique or short-creeping with narrow, ferruginous scales at the apex. Costæ beneath without scales. Lamina generally narrowed downwards. Pinnæ sessile.
4. Leaf herbaceous. Rachis slender 200. *D. mollis* (Jacq.) Hier.
4. Leaf firm to coriaceous. Rachis strong, quadrangular, very hairy 198. *D. Bangii* C. Chr.

3. Rhizome wide-creeping, nearly naked. Costæ beneath as a rule with small scales. Lamina not narrowed downwards, papyraceous to coriaceous. Pinnæ short-stalked.

201. *D. gongylodes* (Schkuhr) O. Ktze.

2. Sporangia setose. A tuberculiform aërophore at the base of the pinnæ beneath. Above the lowermost anastomosing pair of veins are 3—4 pairs of veins connivent to sinus. 202. *D. Martini* C. Chr.

190. *Dryopteris patens* (Sw.) O. Ktze., Rev. Gen. Pl. 2: 813. 1891;
C. Chr. Ark. för Bot. 9¹¹: 31 fig. 6.

- Syn. *Polypodium patens* Sw. Prod. 133. 1788; Fl. Ind. occ. 1673.
Aspidium patens Sw. Schrad. Journ. 1800²: 34. 1801 et auctt. pro parte.
Polypodium arcuatum Poir. Enc. 5: 528. 1804 (Grenada. Mus. Paris!).
Aspidium stipulare Willd. sp. 5: 239. 1810 (Plum. t. 23).
Nephrodium stipulare Jenman, Bull. Dept. Jam. n. s. 3: 93. 1896.
Dryopteris stipularis Maxon, Bull. Torr. Cl. 33: 198. 1906.
Aspidium macrourum Klf. Flora 1823¹: 365; Mett. Aspid. nr. 219.
Nephrodium macrourum Scott, Gen. ad t. 10. 1834; Bak. Syn. 262.
Nephrodium conspersum Schrad. Gött. gel. Anz. 1824: 869.
Aspidium conspersum Kze. Flora 1839¹: Beibl. 32.
? *Nephrodium polytrichum* Schrad. l. c.
Nephrodium dissimile Schrad. l. c.
Nephrodium albescens Desv. Prod. 258. 1827 (Mus. Paris!).
Lastrea Kohautiana Pr. Tent. 76. 1836!
Lastrea scabriuscula Pr. Tent. 75. 1836; Epim. 35!
Nephrodium schizotis Hook. sp. 4: 107. 1862!
Aspidium abruptum Mart. et Gal. Mem. Ac. Brux. 15: 65. 1842 (f. FOURNIER).

Type from Jamaica, leg. SWARTZ (S!).

In my paper on SWARTZ'S type-specimens of ferns (Ark. för Bot. 9¹¹: 28) I have proved that the true *Pol. patens* Sw. is synonymous with *A. stipulare* Willd. and *A. macrourum* Klf. The type-specimens are rather small, while *A. macrourum* is a large-growing form, and *A. stipulare* a form with the upper basal segments very enlarged and deeply lobed, but there is no limit between these forms, which agree exactly in all characters, the size excepted.

The genuine *D. patens* as here understood can be distinguished from related species by these three characters: 1) the erect rhizome, 2) the large, ovate, light-brown, opaque, entire and commonly glabrous scales of the rhizome and stipe; generally they are rather numerous, and 3) by the basal pair of segments, which are much prolonged, acute and both parallel to rachis. Otherwise the species varies very much and it is scarcely possible to give a description, which covers all

its forms. — The fasciculated stipites are deciduously hairy, scaly below, stramineous, the lamina up to 1 m long, firmly herbaceous or even papyraceous, generally dark-green; rachis quadrangular slightly hairy; pinnæ up to 20 cm long, 3—4 cm broad, the lower ones often somewhat reduced and reflexed, strigose on the costæ above, more or less softly pubescent and glandular beneath, especially on costæ and veins; segments subacute, as a rule falcate, the edges often revolute; veins 10 to 16 to a side often somewhat prominent beneath, the lower pair not meeting at sinus but separated by a cartilagineous membrane below the sinus; sori medial or supramedial, the indusium persistent, softly hairy by whitish hairs.

D. patens is distributed over the whole tropical America, common in the West-Indies, Central-America and South Brazil, apparently rather rare in Mexico and the South-American Andes. I have failed to find characters by which forms from different regions may be distinguished from each other, f. inst. most Brazilian specimens agree exactly with the Central-American ones; below I describe four varieties, which however are connected with the type by intermediate forms. It is often impossible to determine with certainty specimens which lack rhizome and lower part of the stipe.

Specimens from Africa and Polynesia are often determined *D. patens*; this species are however no doubt confined to America; the Polynesian plant is partly *D. Harveyi* (Mett.), partly *D. Brackenridgei* (Mett.), the African *D. Bergiana* (Mett.) and *D. Gueintziana* (Mett.).

Below I enumerate some of the specimens examined, mainly such which bear a collector-number.

- West-Indian Islands: Trinidad, FENDLER nr. 18 (B, W); Herb. Trin. Bot. Garden nr. 335, 336 (W), 6252 (C) — Grenada, W. E. BROADWAY nr. 1623 (B); EGGERS nr. 6478 (C, W) — St. Vincent, GUILDING nr. 746 (B), H. et G. SMITH nr. 789 (B) — Barbados, (H); EGGERS nr. 7312 (W) — Martinique, SIEBER nr. 354 (B); L. HAHN nr. 35 (B); BÉLANGER nr. 78 et 80 (B); Père DUSS nr. 19, 24, 221 (C), 1578 (B), 4150 (W); ISERT (H) — Dominica, IMRAY (B); EGGERS (RB) — Guadeloupe, L'HERMINIER nr. 157 (B); Père DUSS nr. 291 (C), 4030 (C), 4031, 4035, 4038, 4041—43, 4046, 4047, 4344, 4424 (W) — Montserrat, RYAN (H) — Saba (S) — St. Croix, EGGERS (H) — St. Thomas, EGGERS nr. 455 c (B, C); RAUNKLER nr. 13 (CC) — Porto Rico, SINTENIS nr. 1975 (C), 2829, 5868 (W); Mr. et Mrs. HELLER nr. 518a, 927 (W); A. A. HELLER nr. 6343 (W); UNDERWOOD and GRIGGS nr. 273, 632 (W) — San Domingo, EGGERS nr. 1866 a (B); PRENLELOUP nr. 726 (C) — Haïti, WEINLAND nr. 32 (B) — Jamaica, DAY nr. 18 (B); G. L. FISHER nr. 983 (R); UNDERWOOD nr. 2791, 2522, 3235 (W); HART nr. 316 (W); MAXON nr. 830, 932, 1398, 1825, 1928, 2263, 2559 (W) — Cuba, Oriente, WRIGHT nr. 1002 (B, S, W), 2118 (W); EGGERS nr. 4906 (R, W); MAXON nr. 3924, 4101, 4102, 4252, 4280 (W); Prov. Santa Clara, R. COMBS nr. 284 (B); Prov. Habana, BAKER nr. 3804 (W) — Prov. Pinar del Rio, PALMER et RILEY nr. 138, 165, 346, 809 (W), CALDWELL et BAKER nr. 7006 (W); without locality, E. OTTO nr. 81 (B); LINDEN nr. 1396 pt. (B).
- Bermuda: Devonshire Marshes, St. BROWN and N. L. BRITTON nr. 84 (CC).
- Florida: South of Miami, Dade Co, A. A. EATON III₁₉₀₅ (W).
- Mexico: Dept. Vera Cruz, Jicaltepec, TLAPACOYO, Colipa et Mirador, LIEBMANN (H); Izhuatlancillo, BOURGEOU nr. 2779 (H); Misantla, SCHIEDE nr. 761 (B); KERBER nr. 435 (W); Córdoba, H. FUNCK nr. 56 (W).

- Guatemala: Dept. Alta Verapaz, near the Finca Sepacuite, COOK et GRIGGS nr. 656 (W), Cubilquitz, v. TÜRKHEIM ed. DONN. SMITH nr. 8051 (B, C, W); Dept. Retalhuleu, San Felipe, J. DONN. SMITH nr. 2734 (W); Dept. Santa Rosa, Estanzuela, HEYDE et LUX ed. DONN. SMITH nr. 4424 (B, W); Zamorora, HEYDE et LUX ed. DONN. SMITH nr. 3248 (W); HEYDE nr. 557 (W); Cuajiniquilapa, HEYDE et LUX ed. DONN. SMITH nr. 6289 (W); Vicinity of Cacao, H. S. BARBER nr. 161, 165, 179, 191 (W).
- Honduras: San Pedro Sula, C. THIEME ed. DONN. SMITH nr. 5673 (C, W).
- Nicaragua: Nandaïme, P. LÉVY nr. 3 (H).
- Costa Rica: NAVARRO, WERCKLÉ (C, CC); Rivière, P. BIOLLEY nr. 44 (C); La Lima, WERCKLÉ (C); Aguacate, C. HOFFMANN nr. 722 (B); Río Ciruelas, TONDUZ nr. 2196 (B, C); Tuis, TONDUZ nr. 11327 (C, W); La Verbena, TONDUZ nr. 8810 (C, W); Juan Viñas, PITTIER nr. 1842 (W); Río General, PITTIER nr. 3340 (W); Buenos Aires, PITTIER nr. 4851 (B, W); San Francisco de Guadeloupe, PITTIER nr. 7154 (W); Río Turrialba, J. DONN. SMITH nr. 6901 (B); Juan Viñas, COOK et DOYLE nr. 179, 233, 243 (W); Río Jirivi, MAXON nr. 130 (W); Meseta central, ALFARO nr. 16848 (C, RB); Sabanilla de Los Granados, ALFARO nr. 16556 bis (RB).
- Panama: MAXON nr. 4781 (W).
- Colombia: Santa Marta, H. H. SMITH nr. 2453 (B, C, Rg) — MORITZ nr. 38, 208 (B), 718 (B, C, H) = *A. riparium* Moritz).
- Venezuela: Caracas, LINDEN nr. 199 (B); E. OTTO nr. 424 (B) et alii; La Guayra, ENGEL nr. 20 (B); Tovar, MORITZ nr. 410 (B).
- Ecuador: LEHMANN nr. 5054 (B); Baños, SPRUCE nr. 5303 (H, L, RB), 5304 (H, RB).
- Peru: Lima (W); RUIZ (B); Tarapoto, SPRUCE nr. 4030 (Kew, L = *N. schizotis* Hk. very typical).
- Chile: CUMING (hb. Presl).
- Brazil: Río, GLAZIOU nr. 389 (H), 4669 (B, H), 13353 (H); SELLOW nr. 688 (B); MOSÉN nr. 2700, 2701, 104, 115 (Rg); JELINEK nr. 185 (B); SCHENCK nr. 3783 (C); CASARETTO nr. 2002 (C) — Parahyba, GÖLDI (C) — Minas Geraes, Lagoa Santa, WARMING (H); Ouro Preto, M. GOMES nr. 2663 (C); CLAUSSEN nr. 136 (B, CC) — São Paulo, Río Claro, LÖFGREN nr. 111 (H); Serra de Cubitão, LINDBERG nr. 22 (B); Sorococaba, MOSÉN nr. 3087 (Rg, S); Serra de Caracal, MOSÉN nr. 4621 (Rg); Toledo, ULBRICHT nr. 3 (R); Río Grande, WACKET nr. 93 (R); Alto da Serra, WACKET nr. 201 (R) — Paraná, Icarehý, DUSÉN nr. 6611 (Rg) — Sta. Catharina, Itapocú, SCHWACKE nr. 12961, 12958 (C); Passo Mansa, F. HAERCHEN ed. ROSENSTOCK, Fil. exsicc. austr. bras. nr. 199 (C, R, Rg, W); HAERCHEN nr. 201, 203, 205, 207, 209, 210, 211, 212, 213, 216, 217, 218 (R); San José, GOLTZ nr. 27 (R) — Río Grande do Sul, Sta. Cruz, JÜRGENS ed. ROSENSTOCK, Fil. exsicc. austr. bras. nr. 81 et 85 (B, R, Rg, W); Río Parde, JÜRGENS et STIER nr. 36 et 239 (R); Serra do Melo, JÜRGENS nr. 369 (R); Porto Alegre, STIER nr. 307 (R).
- Argentina: Salto del Encuentro, Río Piray, NIEDERLEIN nr. 1929 (B) — Corrientes, E. PALMER (W).

Varieties of *D. patens*.

var. *dependens* n. var.

Rhizome and scales as in the type, but the leaf much smaller; stipe 20 cm long, lamina 25 cm long by 15 cm broad, herbaceous, light-green; pinnæ opposite, close 8—9 cm long, about 1 cm broad, the basal ones generally reflexed and somewhat abbreviated; upper basal segment of the lower pinnæ broadly ovate, deeply lobed and reflexed over the rachis, the following ones gradually increasing in size to the middle of the pinna. Pubescence thin, underside generally densely glandulose by shining glands. Veins 6—9-jugate, the posterior basal one reaching the margin above the sinus. Sori near the margin, indusia very slightly pubescent or even glabrous.

A characteristic form, which resembles not a little *D. augescens*, but it is thin-leaved and the rhizome and scales different. It seems to be common in Venezuela and similar forms occur in the West Indies, where intermediate forms between the type and the variety are to be found. Such a form is that from St. Kitts, leg. BREUTEL, on which PRESL partly founded his *Lastrea scabriuscula*, which name I retain for a Brazilian form.

Venezuela: La Guaira, ROBINSON et LYON (W); E. OTTO nr. 467 (B); EGGERS nr. 13245 (H); Caracas, MORITZ nr. 79 (B) et alii; Tovar, FENDLER nr. 192 (B); MORITZ nr. 119 et 245 (B).

Colombia: LINDIG nr. 369 (B).

Barbados: HARIOT (C) — Guadeloupe, ISERT (H) — Montserrat, RYAN (H) — San Domingo, Sierra del Palo Quemado, EGGERS nr. 1866 a et c (B) — Haiti, Marmelade, Nash et Taylor nr. 1294 (W) — Jamaica, J. DAY nr. 227 (B) — Cuba, LINDEN nr. 1936 (B).

Guatemala: Dept. Santa Rosa, Zamorora, HEYDE et LUX ed. DONN. SMITH nr. 3246 pt. (W) — Guatemala, Donn. Smith nr. 2463 (B); very small; lamina 10 cm long, 4 cm broad, glabrous).

var. *scabriuscula* (Pr.).

Syn. *Lastrea scabriuscula* Pr. Epim. 35. 1849 (pt.).

Aspidium nephrodioides Fée, Cr. vasc. Br. 1: 138 tab. 46 fig. 1. 1869.

Not essentially different from var. *dependens*, but much larger; it differs from the type by the thin texture, light colour and sparse pubescence, the upper basal segment of the lower pinnæ is nearly always deeply lobed but not always very prolonged; underside, especially on costæ and costules densely glandular; indusia thin, flat, rather setose.

Rio: MIKAN (herb. PRESL!); GLAZIOU nr. 2359 (H); MOSÉN nr. 2699 (Rg, S); LINDMAN nr. A. 221 (Rg) — Minas Geraes, Ouro Preto, M. GOMES nr. 3008 (C); Tombadouro, SCHWACKE nr. 13543 (C); Lagoa Santa, WARMING nr. 789 (H) — São Paulo, Santos, MosÉN nr. 3087 (H).

var. *deversa* (Kze. pt., Mett.).

Syn. *Aspidium deversum* Kze. Linnaea 23: 226, 299. 1850 pt., Mett. Aspid. nr. 209.

Aspidium patens Link, Fil. sp. 100. 1841; ? Raddi, Pl. bras. 1: 32 tab. 48.

Nephrodium deversum Ros. Hedw. 43: 224. 1904.

Dryopteris deversa var. *minor* Hieron. Hedw. 46: 326. 1907.

A. deversum Kze. is partly *D. mollis* partly this variety, which latter was described by METTENIUS under the name *A. deversum* and by him supposed to originate from Cuba; it was described after cultivated specimens, which I have seen (B), but I have not seen a Cuban specimen resembling it, while not a few specimens from South Brazil quite correspond with the original one. It is *A. patens* Link, who quoted the locality: Rio de Janeiro and RADDI's plate. I also believe that this form is RADDI's *A. patens*; RADDI says namely: "Indusiis paucis supra pilis albidis, sed plerumque nudis". — I cannot agree with ROSENSTOCK and HIERNYMS in considering this form a species distinct from *D. patens*; the var. *scabriuscula* connects it with the type. It differs mainly from true *D. patens* by its almost quite glabrous leaf and indusia; the underside it rather glandular.

Rio: STÜBEL nr. 1156 (B); REGNELL nr. 252 (Rg) — Minas Geraes, Caldas, MOSÉN nr. 2176 (H, Rg, S); Lagoa Santa, WARMING nr. 790 (H) — Sta. Catharina, Blumenau, HAERCHEN (R).
Paraguay: Sierra de Amambay, HASSLER nr. 10411 (RB) — San Salvador, J. D. ANISITS nr. 2700 (Rg).

D. deversa var. *tarapotensis* Ros. Fedde, Repert. 7: 298. 1909 from Peru, Tarapoto, SPRUCE nr. 4066 pt (RB) is a peculiar form with distant pinnæ, the lowermost pair much reduced; it belongs scarcely to the var. *deversa* (Kze.) as here understood, but may be named *D. patens* var. *tarapotensis* (Ros.). It is densely glandulose beneath,

var. *lanosa* n. var.

A large form of the *macroura*-type; characterized by its very dense pubescence of the veins and indusia; the hairs are very long and the indusia are perfectly concealed by a dense mass of long white hairs.

Mexico: L. HAHN nr. 22 (B); BOURGEOU sine num. (B).
Costa Rica: Navarro, WERCKLÉ (C).

Aspidium Germani L'Herm.; Fée, 11 mém. 82 tab. 23 fig. 3 from Guadeloupe, L'HERMINIER (Herb. COSSON, Mus. Paris!) is probably a form of *D. patens*. The specimen seen does not agree perfectly with FÉE's figure but appears to be a young plant with very thin leaves and crenate segments. Certainly the general habit of the plant and the scales resemble more *D. normalis* than *D. patens*, but the rhizome is erect. It must provisionally stand among the *species dubiæ*.

191. *Dryopteris Goedenii* Rosenst., Fedde, Repert. 4: 296. 1907.

Type from Brazil, Sta. Catharina, Blumenau, G. GOEDEN (R! also CC).

A rather problematic species, resembling very much small forms of *D. Bangii*, but the rhizome is erect and the lamina not so decidedly narrowed downwards. The scales of the rhizome is like those of *D. mollis*.

192. *Dryopteris normalis* C. Chr. Arkiv. för Bot 9¹¹: 31. 1910.

Syn. *Nephrodium patens* Jenm. Bull. Dept. Jam. n. s. 3: 165. 1896; W. Ind. and Guiana Ferns 240, et auctt. (pro parte).

Aspidium patens Eaton Ferns N. Amer. t. 70 et auctt. (pro parte).

As type of this species I take the Jamaican form, well described by JENMAN and first rightly understood by him. He says (loc. cit.): "this is distinguished absolutely from all its creeping under-ground root stock, upon which the fronds are arranged in a bi-linear series". To this must be remarked that *D. augescens* has a similar rhizome.

D. normalis is in general habit very near small forms of *D. patens*, and specimens without rhizome can not always be determined with certainty. Besides the rhizome the scales show a constant specific character. The scales of the rhizome and the basal part of the stipe are few, mainly confined to the growing apex

of the rhizome; they are narrow-linear, thin, glossy castaneous, ciliated and hairy on the surfaces. A single scale is generally sufficient for determination. Compared with *D. patens* the leaf of *D. normalis* show some peculiarities, which are however not very constant. The lamina is rarely over 4–5 dem long, gradually narrowed into the pinnatifid apex, pinnæ 10–12 cm long by $1\frac{1}{2}$ –2 cm broad, firmly herbaceous or membranous. Segments acute or rather obtuse, a little oblique but not falcate, the basal ones generally enlarged, especially the upper one, which is parallel to rachis but rarely lobed; the lower one as a rule not very enlarged and forming an angle of 45° with rachis. Upperside glabrous or sparsely pubescent, the costæ softly hairy, underside rather densely and softly pubescent on costæ and veins, and generally glandulose by shining glands, which are most numerous on the veins.

Veins 8–10-jugate, not prominent, the lowest pair meeting at the sinus, where they are not separated by a hyaline membrane. Sori as a rule supramedial; indusium shortly pubescent.

Although *D. normalis* by most authors is believed to be a near relative of *D. patens* I am inclined to believe that it is more closely related to *D. mollis*, which it resembles in the structure of the scales and also in venation; it is, namely, not rare to find truly anastomosing veins as in *D. mollis*, but the lower pinnæ of *D. normalis* are not gradually reduced as in *D. mollis*. To the other side *D. normalis* is through *D. augescens* by intermediate forms connected with *D. serra* and through *D. Feei* with *D. oligophylla*.

JENMAN (W. Ind. & Guiana Ferns 240) says that *D. normalis* is distributed from Florida and Texas to Brazil and in the West-Indies from Bermuda and Bahamas to Trinidad and Dominica. I have examined hundreds of specimens but I have seen none from the Lesser Antilles or South America. As far as I have learned the species is distributed from Porto Rico to Mexico and Guatemala, Texas and Alabama. It is rather variable and below I describe a couple of varieties. Here I enumerate the more important collector-numbers of specimens, which I refer to the type.

Porto Rico: Mr. and Mrs. HELLER nr. 82 (W); G. P. GOLL nr. 120, 896, 897 (W).

Jamaica: MAXON nr. 713, 1005, 1503, 1703, 1782, 2100, 2366, 2536 (W); UNDERWOOD nr. 128, 2568, 2761 (W); FREDHOLM nr. 3346 (W); CLUTE nr. 100 (W); LEVISON nr. 2 (Rg); DAY (B).

San Domingo: L. A. PRENLELOUP nr. 724 (C); M. FUERTES nr. 780 (B).

Cuba: Prov. Habana, BAKER and WILSON nr. 309 (W); H. LEON nr. 142 (W); ABARCA and O'DONOVAN nr. 4095, 5395 (W); van HERMANN nr. 3304 (W); A. H. CURTISS nr. 696 (W); BAKER and O'DONOVAN nr. 4107 (W) — Prov. Santiago, POLLARD and PALMER nr. 96 and 315 (W) — Prov. Pinar del Rio, PALMER and RILEY nr. 106, 294, 624 (W); CALDWELL and BAKER nr. 7107 (W).

Florida: S. M. TRACY nr. 6630, 7632, 9142 (W); F. RUGEL nr. 254 (W); GEO. V. NASH nr. 840, 861 (B, W); UNDERWOOD nr. 181 (W); A. H. CURTISS nr. 3743 (B, W), 4810 (W).

Georgia: R. M. HARPER nr. 1062 (W), 1192 (B, W), 1924 (W).

Alabama: HARPER nr. 131 (W).

Mississippi: S. M. TRACY nr. 8634 (W); J. DONN. SMITH nr. 672 (W).

Louisiana: B. F. BUSH nr. 26 (W); A. B. LANGLOIS nr. 141 (W).

Texas: B. F. BUSH nr. 1466 (W); CURTISS ed. BAENITZ, Herb. Americ. nr. 860 (S); E. PALMER nr. 1433 (W).

While most specimens from the Southern U. S. do not differ materially from the Jamaican type, some of them show a tendency to variation in the direction of *D. augescens*; they are often of a firmer texture, sometimes even coriaceous, and the lower pinnæ are sometimes slightly narrowed towards the auricled base. This latter character is still more pronounced in the two following varieties.

var. **Harperi** n. var.

Lower pair of pinnæ rather reduced and, like the following pair conspicuously narrowed toward the base, the upper basal segment still not very reduced. Pinnæ incised nearly to rachis, the segments oblique, acute, the edges often revolute. The basal anterior vein only runs to sinus, the posterior one reaching the margin about 1 mm above sinus. Sori small, near the edge; indusium subglabrous.

Georgia: Hawkinsville, Pulaski Co., R. M. HARPER nr. 1382 (type, W); rocky bank of Chattahoochee River, Clay Co., HARPER nr. 1788 (W); near Albany, Dougherty Co., POLLARD and MAXON nr. 531 (W).

var. **Lindheimeri** A. Br. pro specie sub *Aspidio*, ms. in Herb. Berol.

Intermediate between typical *D. normalis* and *D. augescens*, and some specimens could as well be referred to the latter. It differs from *D. normalis* type by the firmer texture, the more distant and often opposite pinnæ, the lower ones scarcely reduced but distinctly narrowed towards their base as in the preceding variety and in *D. augescens*; segments acute, often subfalcate; veins generally somewhat prominent beneath, the two lower ones meeting at sinus; sori near to the edge; in some specimens some few small scales are found on the costæ beneath, quite as in *D. augescens*, from which species it differs by its broader pinnæ and by its lamina not being so abruptly narrowed upwards.

Texas: F. LINDHEIMER nr. 742 (B, type, W), 1276 (H); Houston, E. HALL nr. 855 (W); near Kerrville, V. BAILEY nr. 470 (W); near mouth of Pecos River, V. HAVARD (W); San Antonio, Bexar Co., A. A. HELLER nr. 1835 (W); near Laredo, E. PALMER nr. 1432 (W); Edwards Co., R. J. HILL nr. 41 (W).

193. **Dryopteris augescens** (Link) C. Chr. comb. nov.

Syn. *Aspidium augescens* Link, Fil. sp. 103, 1841; Kze. Farrnkr. 134 tab. 59; Mett. Fil. Lips. 91.

Originally described after plants cultivated in the Botanical Garden of Berlin and raised from spores of plants collected by E. OTTO in Cuba; LINK says "Caracas" and METTENIUS "Mexico", but OTTO's original specimens are from Cuba: auf Felsen, Via Tumbadero nr. 89 (B!), with which LINK's original specimens exactly agree like several other specimens from Cuba.

D. augescens is a very critical species, very well described and figured by KUNZE. It is almost exactly intermediate between *D. normalis* and *D. serra*, agreeing with both in the creeping rhizome and the shape and colour of the scales. In general habit it resembles *D. normalis*, from which it differs by 1) the firmer lamina, which rather suddenly narrows upwards into a pinnatifid apex but not having a distinct terminal pinna as *D. serra*, 2) the narrower pinnæ, about 1 cm broad, the lower ones a little narrowed towards the shortly auricled base, 3) the presence of small, hairy scales on the costæ beneath, exactly resembling those of *D. serra*, similar scales are often found on the rachis, 4) the very acute, oblique or patent but not falcate, oblong-triangular segments with somewhat revolute edges, and 5) by the veins being prominent beneath. — From *D. serra*, which it resembles very much in pubescence by hairs and scales, it differs by 1) the shorter pinnæ, which are rarely more than 12 cm long, less acuminate and more deeply cut, 2) the want of a distinct terminal pinna, 3) the lower basal segment of most pinnæ not adnate to rachis, 4) thinner texture and less prominent costæ, 5) the non-falcate segments, and 6) the basal anterior vein only running to sinus, the posterior one generally reaching the margin a little above the sinus.

— Stipes slightly scaly downwards, rather slender, 30–50 cm long; lamina of the same length, fresh- or darkgreen; costæ above more or less pubescent, the upperside elsewhere glabrous; underside not glandulose. Veins about 8 to a side; sori a little supramedial, furnished with persistent, setose indusium.

The following specimens are typical:

- Cuba: Prov. Habana, Nazarene, BAKER nr. 1893 (W); Puntos Grandes, H. LEON nr. 165 (W); near Santiago de las Vegas, WILSON nr. 444 (W) — San Antonio de los Baños, BAKER & O'DONOVAN nr. 4132 (W) — Tabureto, E. OTTO nr. 215 (B) — Prov. Pinar del Rio, Guanajay, EARLE et WILSON nr. 1511 (W); near Caiamito, PALMER et RILEY nr. 705 (W) — Isle of Pines, PALMER et RILEY nr. 1120 (W).
- Mexico: San Luis Potosi, near Rascon, EDW. PALMER nr. 661 (W); near Tancanhuitz, C. et E. SELER nr. 695 (B); SCHAFFNER sine num. (B) — Jalisco, near Guadalajara, EDW. PALMER nr. 76 (W) — Colima, San Marcos, M. E. JONES nr. 529 (W) — Tamaulipas, near Victoria, EDW. PALMER nr. 569 (W).
- Costa Rica: Cartago, J. J. COOPER, ed. J. D. S. nr. 6050 (W).

The following specimens from Bahama Islands resemble very much *D. serra* in size and are perhaps belonging to that species; still they agree best with *D. augescens* in most differential characters.

Andros, Nicols, Town, J. and A. NORTHROP nr. 441 (B); Providence, Nassau, J. and A. NORTHROP nr. 173 and 240 (B); Rawson W. RAWSON (B); EGGERS nr. 4178 (H).

While the Mexican specimens enumerated above are very typical some other specimens are scarcely to distinguish from *D. normalis* var. *Lindheimeri*; these specimens again are intermediate between the type and the larger, common Mexican fern registered in my Index as *D. Feei* C. Chr. It is impossible to me to distin-

guish this *D. Feei* specifically from *D. augescens*, as the two are connected by all intermediate forms. I call the large Mexican form

var. **puberula** (Fée).

Syn. *Aspidium puberulum* Fée, 10. mém, 40. 1865.

Nephrodium puberulum Bak. Syn. 495. 1874.

Dryopteris Feei C. Chr. Ind. 264. 1905.

In structural characters scarcely different from *D. augescens*, but generally larger: stipe up to 70 cm long, stramineous, glabrous, lamina 40–60 cm long: pinnæ 15–20 cm long by 2 cm wide. Veins about 10, prominent beneath, the lower 2–3 meeting at sinus, where as a rule a distinct apophysis is to be found. Undersurface softly villous and sometimes glandulose. The rhizome is very long-creeping. Segments generally very acute and close.

An extremely variable variety; I refer hereto specimens coming very near to typical *augescens*, others very much resembling *D. normalis* and *D. patens*, and others again which are not unlike smaller forms of *D. oligophylla*. Still I have no doubt that all these forms must be referred here and united with *D. augescens*. The most difficult problem to solve is, however, whether the whole series of forms is to refer to a separate species or ought to be united with *D. normalis*. The form from Texas called *D. normalis* var. *Lindheimeri* seems to show that we have only one very variable species, which should be named *D. augescens*, but on the other hand it is unnatural to unite into a single species the typical forms of *D. normalis* and *D. augescens*, and I prefer here to refer the different forms to two species.

It is interesting to note that we here have another example of a series of forms which in their distribution is quite analogous with the series *D. opposita* — *D. panamensis* and *D. Sprengelii* — *D. Mercurii*, all dealt with in my previous papers, and with *D. tetragona* and the intricate forms of it from Mexico — Central America. In all these series the first named species is found in the West-Indies, where it varies only a little, while the second species is mostly developed in Central America, where it varies extraordinarily and where some forms occur, which scarcely can be distinguished from the corresponding island-species.

Aspidium puberulum Fée was described after specimens from Mexico, near Huatusco, SCHAFFNER nr. 247 part., which I have not seen. FOURNIER (Pl. Mex. I: 95) refer here some specimens of the BOURGEOU collection which I have seen in the museum of Paris. With these specimens agree more or less the following;

Mexico: Lower California, Cape Region, BRANDEGEE (W); Tres Marias Islands, E. W. NELSON nr. 4316 (W); MALTBY nr. 161 (W) — Cuernavaca, BOURGEOU nr. 1318 (H) — Puebla, ARSÈNE nr. 1614, 1690, 1820, 1991, 2006, 2026, 2036, 2145, 2150, 2151 (RB) — Morelia, ARSÈNE (RB, C) — Orizaba, H. E. SEATON nr. 67 (W) — Jalisco, near Guadalajara, ROSE and PAINTER nr. 7416 (W); EDW. PALMER nr. 455 (W); Colima, EDW. PALMER nr. 1229 pt. (W) — Acapulco, EDW. PALMER nr. 442 (W) — Tamaulipas, near Victoria, EDW. PALMER nr. 183 and

570 (W) — San Luis Potosi, Rio Verde, EDW. PALMER nr. 32 (W) — Chiapas, near Petapa, COLLINS and DOYLE nr. 94 (W) — Durango, San Ramon, EDW. PALMER nr. 124¹/₂ (W) — Morelos, near Cuernavaca, ROSE and PAINTER nr. 10232 (W).

Guatemala: Depart. Jzabal, Livingston, W. A. KELLERMAN nr. 5082 (W) — Cuajiniquilapa, Depart. Santa Rosa, 2500, HEYDE et LUX ed. J. D. S. nr. 6289 (B, C, W).

var. *geropogon* (Fée).

Syn. *Aspidium geropogon* Fée, 10. mém. app. 1865.

Dryopteris geropogon C. Chr. Ind. 267. 1905.

Differs from var. *puberula* only by the almost glabrous frond and perfectly glabrous indusia.

Mexico: GALEOTTI nr. 6311 (Herb. Paris) — Cuernavaca, BOURGEOU nr. 1319 (H, Herb. Paris) — Lobani, LIEBMANN (H).

194. *Dryopteris Berroi* n. sp. — Fig. 24.

Type from Uruguay, in locis umbrosis ad ripam San Antonio, leg. M. B. BERRO nr. 5243 (CC).

Rhizomate repente paleis brunneis sparse onusto. Stipitibus 4—6 dem longis, stramineis, glabris. Lamina 4—5 dem longa, herbacea vel membranacea, gramineo-viridi, rachi costisque subtus sparse pubescentibus exceptis glabra, bipinnatifida. Pinnis sessilibus, suboppositis, 15—18 cm longis, 1¹/₂—2 cm latis, longe acuminatis, basalibus vix reductis, versus basin parum attenuatis, ad alam 2—3 mm latam pinnatifidis. Laciniis falcatis, acutis, integris, marginibus revolutis. Venis simplicibus, 10—14-jugis, subtus prominentibus, basalibus ad apophysem callosam distinctam, saepe acutam excurrentibus. Soris supramedialibus vel margini approximatis, parvis; indusiis persistentibus, reniformibus, glabris vel breviter hirtis.

Intermediate between *D. patens* var. *deversa* and *D. oligophylla*, resembling the former in size, texture, colour and nearly glabrous frond, the latter in the creeping rhizome, prominent veins and the distinct yellowish apophysis, which often resembles a tooth at the sinus. I regard it as a near relative of *D. oligophylla*, like a very reduced form of that species. The lower segments of the lower pinnæ are in large specimens rather reduced but never to the same extent as in *D. oligophylla*; the basal segments of the middle and upper pinnæ are a little prolonged. I have found on the costæ beneath some minute scales, which resemble those of *D. oligophylla*. The rachis and costæ are straw-coloured.

I refer here the following specimens:

Uruguay: BERRO nr. B (C = nr. 5243 of my collection) — Frey Bentos, ARECHA-VALETA nr. 2025 (C).



Fig. 24. *D. Berroi* n. sp. Pinna $\times \frac{4}{5}$ and segments $\times 1\frac{1}{2}$ (orig.).

Argentina: Misiones, Loreto, EKMAN nr. 10 (Rg, S); Bonpland, EKMAN nr. 11 (S) — Alta Graecia, Prov. Córdoba, TH. STUCKERT nr. 2605 (C).
 Paraguay: Arroyo Fogatingo-mi and San Salvador, J. D. ANISITS nr. 2700 (B, W — a form of thinner texture and veins 8–9-jugate).

195. *Dryopteris serra* (Sw.) O. Ktze. Rev. Gen. Pl. 2: 813. 1891;
 C. Chr. Ind. 291 pt.

Syn. *Polypodium serra* Sw. Prod. 132. 1788; Fl. Ind. occ. 1665.

Aspidium serra Sw. Schrad. Journ. 1800²: 33. 1801; Mett. Asp. n. 226
 (C. Chr. Ark. för Bot. 9¹¹: 34 fig. 9 et tab. 2 fig. 1, illustrating the
 type-specimen).

Nephrodium serra Desv.; Bak. Syn. 289; Jenm. Bull. Dept. Jam. n. s.
 3: 164.

Type from Jamaica leg. SWARTZ (S!).

In its typical form a most distinct species characterized by its hard, coriaceous texture, long and narrow pinnæ and a distinct terminal pinna. The type-specimen belongs to a small form with a proportionally very long terminal pinna and only 6–8 pairs of lateral pinna, but the species grows much larger. The dimensions of the largest specimen seen from Jamaica are: stipe 130 cm long, over 1 cm thick at base, lamina about 1 m long, about 40 pairs of lateral pinnæ, which are 25 cm long by 8 mm wide, the terminal pinna 17 cm long; this large form does not differ otherwise from the Swartzian type. — Rhizome creeping rather densely clothed by hairy scales. Stipe and upper surface of the light-green lamina glabrous, rachis deciduously and shortly puberulous by thin hairs, which are often furcate, and very sparsely furnished with small scales. The very prominent stramineous costæ and veins beneath rather densely woolly-pubescent and the costæ moreover clothed by rather numerous, very narrow and thin ciliated scales. Pinnæ scarcely reduced towards the base, sessile, the upper basal segment about 1 mm remote from the lower one adnate to rachis, very acuminate towards the apex, regularly and sharply serrated, most deeply at the middle. Teeth triangular, the edges revolute, those of the lower part of the lower pinnæ often nearly obsolete. Veins very close, prominent beneath, stramineous, 7–12-jugate, the lower 2–4 connivent to sinus. Sori a little above the middle of the vein, furnished with a pale or reddish, setose, persistent indusium.

D. serra differs from the related *D. oligophylla* by its much narrower pinnæ, coriaceous texture and the terminal pinnæ, the lower pinnæ are never reduced towards the base in the same manner as in *D. oligophylla*, with which METTENIUS and KUHN united it. The typical form is apparently confined to the larger islands and both the small and the large form are found in all islands.

I have seen the following specimens:

Porto Rico, SINTENIS nr. 5826 (B, C, S, W), 5827 (C, W); UNDERWOOD and GRIGGS nr. 37 (W).
 Jamaica, near Troy, UNDERWOOD nr. 2906 (W) — Mt. Diabolo, MAXON nr. 2330 (W) — HART nr. 232
 (W) — Hollymount, UNDERWOOD nr. 3460 (W).

San Domingo: WRIGHT, PARRY and BRUMMEL nr. 8 (W); H. VON TÜRKHEIM nr. 2721 (B) — Haïti, near La Barrière Couchant, NASH and TAYLOR nr. 1075 (W) — JAEGER nr. 202 (W).
 Cuba: WRIGHT nr. 923 (S, W) — Oriente, Santa Ana, north of Jaguey, MAXON nr. 4130 (W) — south of Jaguey, MAXON nr. 4169 (W) — Rio Seco, EGGERS nr. 4726 (W) — Mt. Liban, LINDEN nr. 1904 (or 1901) (RB).

In Haïti a form occurs, which is intermediate between *D. serra* and *D. oligophylla*; pinnæ $1\frac{1}{2}$ cm broad, incised about halfway into falcate, very acute segments; in texture and colour it comes nearest to *D. oligophylla*.

Haïti: PICARDA nr. 1030 (C); Rio Bigothon, EGGERS nr. 3308 (C) — San Domingo, Rio Mameges et Rio Bajabonico, EGGERS nr. 2527 (C, CC. H, W).

In Cuba and the Bahamas a form grows, which perhaps belong to *D. serra*, but which I refer to *D. augescens* (see under that species).

196. *Dryopteris oligophylla* Maxon, Contr. U. S. Nat. Herb. 10: 489.

1908. — Fig. 25.

Syn. *Polypodium invisum* Sw. Prod. 133. 1788; Fl. Ind. occ. 1672 (C. Chr. Arkiv för Bot. 9¹¹; 24 fig. 3. 1910).

Aspidium invisum Sw. Schrad. Journ. 1800²: 34. 1801; Mett. Aspid. nr. 211.

Nephrodium Sloanei Bak. Syn. 263. 1874; Jenman, Bull. Dept. Jamaica n. s. 3: 164; W. Ind. and Guiana Ferns 238.

Dryopteris Sloanei O. Ktze. Rev. 2: 813. 1891.

Dryopteris patens subsp. *invisa* C. Chr. Ind. 283.

Aspidium serra var. *incisum* Mett.; Krug, Engl. Jahrb. 24: 118. 1897.

Type from Jamaica, leg. SWARTZ (S!). — In my paper in Arkiv för Bot. 9¹¹: 24—25 I have dealt with the type-specimens of this species.

Rhizome wide-creeping finger thick, clothed with rather thick, dark-brown, hairy scales. Stipites at distances of 5—6 cm, slightly scaly at base, glabrous or finely pubescent, 1 cm thick, often over 1 cm high. Rachis glabrous or more or less pubescent. Lamina 1—2 m long, membranous, chartaceous or coriaceous; pinnæ rather numerous, up to 5 dm long, 3—4 cm broad, the lower ones scarcely reduced, short-stalked, upper ones sessile, long acuminate, the lower 2—3 pairs attenuated towards the base, incised to a narrow wing into subfalcate or oblique entire, acute segments with acute sinuses between, the lower ones of the lower pinnæ gradually reduced, those of the basiscop side abortive and often entirely obsolete. Surfaces eglandulose, glabrous or more or less pubescent, especially on the ribs; minute hairy scales are often to be found on the costæ beneath. Veins 15—20 to a side, simple, prominent beneath; the lower 2—4 run together to a callose membrane, which often forms an apophysis beyond the sinus. Sori rather small, about medial, furnished with large, persistent, glabrous or pubescent indusia.

This very large species is a near relative of *D. serra*, with which METTENIUS united it, but abundantly different from *D. patens*, to which BAKER in Flor. bras.

referred it. From *D. serra* it differs besides by size by the characteristic base of the lower pinnæ, the lower basiscop segments being fully obsolete. The species is distributed over the the whole tropical America, but the specimens from different regions do not agree exactly with the West-Indian type. I can distinguish the following forms:

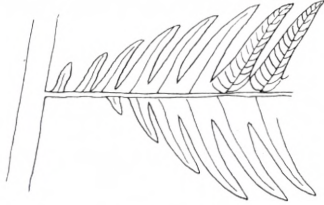


Fig. 25. *D. oligophylla* Maxon.
Basal portion of a lower pinna,
 $\times \frac{4}{5}$.

1. **typica**. The common Jamaican form is marked by its very characteristic reddish lamina when dried and by its flesh-coloured indusia, it is often quite glabrous and glossy on the upperside, some specimens are very finely pubescent on the costæ and veins beneath; indusia glabrous or minutely pubescent. — With this form agree most specimens seen from other islands, still some of them, especially those from Porto Rico, are scarcely different from the continental form.

St. Thomas: EGGERS nr. 455d (B, C) — St. Kitts, BRITTON and COWELL nr. 483 (W).
Porto Rico: UNDERWOOD and GRIGGS nr. 75 (W); SINTENIS nr. 411 (C, S, W), 2068 (B, W), 2636 (B, W), 4593 (C, W) — Haïti, PICARDA nr. 1030 (C).
Jamaica: MAXON nr. 1003 (W); O. HANSEN (H); WILSON nr. 682 (B); HART nr. 201 (W); G. L. FISHER nr. 983 (R); UNDERWOOD nr. 3249, 3301 (W).
Cuba: WRIGHT nr. 1003 (S), 3922 (S), Valley of Rio Bayamita, MAXON nr. 3920 (W) — Pinar del Rio, Mts. near Jaco Jaco, BAKER nr. 3804 (W).

2. var. **pallescens** C. Chr. n. var.

Syn. *Aspidium giganteum* Moritz msc. non Bl.

The continental form, differing from the type by the grey-green, coriaceous lamina and the pale or yellowish, more distinctly hairy indusia; rachis and ribs beneath more distinctly hairy and the costæ beneath furnished with some small, ciliate, brown scales. It grows larger than the West-Indian form. Some of the smaller forms are scarcely to distinguish from *D. augescens* var. *puberula*.

Mexico: Anganguero, v. CHRISMAR (B).
Costa Rica: Navarro, WERCKLÉ (C); La Lima, WERCKLÉ (C, CC) — Rio Corozal, Golfo Dulce, TONDUZ nr. 9978 = DONN. SMITH nr. 7214 (C, W) — Cañas Gardas, PITTIER nr. 10964 (C, W) — Atirro, DONN. SMITH nr. 6900 (W) — Santo Domingo de Golfo Dulce, TONDUZ nr. 10023 (= DONN. SMITH nr. 7215) (C, W) — Rio Turrialba, DONN. SMITH nr. 6901 (W) — Meseta Central de San José, 2000 m, ALFARO nr. 16902 (C, RB) — Veragua, WARSEWICZ nr. 47 (B).
Panama: MAXON nr. 4993, 5763 (W).
Colombia: Santa Marta, H. H. SMITH nr. 2454 (C, Rg) — Ibaqué, STÜBEL nr. 13 (B) — Tolima, SCHMIDTCHEN (B).
Venezuela: MORITZ nr. 424 (B, C, H), 412 (B).
Ecuador: Balao, EGGERS nr. 14660 (W); El Recreo, EGGERS nr. 15037 (W).

3. var. **lutescens** C. Chr. n. var.

Smaller than the preceding variety, as a rule yellowish green; lower pinnæ less reduced towards the base.

Brasilia: Minas Geraes, Caldas, MOSÉN nr. 2144, 2145 (H, L, Rg); São Paulo. REGNELL nr. III. 1448 (Rg); WIDGREN (S) — Rio Grande do Sul, JÜRGENS and STIER nr. 182 (R).

4. var. **Kunzeana** (Hook.).

Syn. *Nephrodium Kunzeanum* Hook. sp. 4: 102. 1862.

Dryopteris Kunzeana C. Chr. Ind. 273. 1905.

Aspidium abruptum Kze. Linnaea 9: 93. 1834 (non Blume) etc., see Index.

Closely allied to var. *pallescens* and certainly not specifically distinct from *D. oligophylla*. Rachis and costæ and veins beneath densely but very shortly downy by simple or sometimes forked hairs; scales rather frequent beneath. Sori just within the margin, furnished with a subglabrous indusium.

Peru: POEPPIG (specim. auth. hb. Presl, B) — Tarapoto, SPRUCE nr. 4066 (RB) — SCHENKE nr. 47 (R).
Ecuador: Rio Balao, EGGERS nr. 14523 ("8' high" L).

5. var. **aequatorialis** n. var.

Rachis, costæ and veins beneath and indusia densely but shortly hairy. Scales on the costæ beneath rather numerous. Pinnæ numerous, about 30 to a side, rather close, 25 cm long by 2 cm broad.

A most distinct variety, very different from the Jamaican type but connected with it by the var. *pallescens*.

Ecuador: Andes quitenses, SODIRO (C, by SODIRO named *Nephr. patens*) — Santa Jues, Rio Pastaza, Jivaria de Pintuc, STÜBEL nr. 871 (B) — prope Niebli, LEHMANN nr. 5053 (B; "Laub frisch-gelbgrün) — Baños ad fl. Pastaza, SPRUCE nr. 5296 (RB).

Peru: SCHENKE 1909 (R).

Bolivia: M. BANG nr. 2313 (B, W).

197. **Dryopteris Tuerckheimii** (Donn. Smith) C. Chr. Ind. 299. 1905.

Syn. *Nephrodium Tuerckheimii* Donn. Smith, Bot. Gaz. 12: 133 tab. 11. 1887.

Type from Guatemala, Dept. Alta Verapaz, near Coban, leg. H. v. TUERCKHEIM, ed. J. DONN. SMITH nr. 704 (W!, B); beautiful specimens were collected at the same locality in 1906—1907 by the same collector, nr. II. 1200 (W) and in the same region, Tamajú, ed. DONN. SMITH nr. 1568 (W).

Perhaps the most distinct species of the whole group, intermediate between *D. patens* and *D. oligophylla*; it resembles the former in the sessile pinnæ, which are not reduced towards the base, the basal segments being enlarged and the upper one often very large and lobed, and by the two basal veins only running to the sinus; it resembles the latter by its creeping, scaly, thick rhizome, by its strong stems and coriaceous texture; from both it differs by the densely scaly stipe, rachis and costæ beneath. The scales are dull-brown, ovate or oblong-acuminate, glabrous and resemble mostly those of the rhizome of *D. patens*. In some specimens the stipe and rachis are entirely covered by such scales. The upper-surface is slightly pubescent, while the underside is densely soft-hairy on the ribs by long,

whitish hairs. Segments falcate with revolute edges. Veins 18—20 to a side. Sori supramedial, furnished with a very densely hairy indusium. Dimensions: Stipe 6—8 dm long, 1 cm thick; lamina 1 m or more long; pinnæ up to 35 cm long, 3¹/₂ cm broad, but generally smaller.

198. *Dryopteris Bangii* C. Chr. Vid. Selsk. Skr. VII. 4: 333. 1907 with fig.

Type from Bolivia, near Coroica, A. *Miguel Bang* nr. 2321 (H!, B). Differs from all forms of *D. patens* and *D. mollis* by its creeping rhizome, its thick quadrangular, very tomentose rachis, its whole hairy appearance and rigid texture, the lamina is narrowed downwards, and the venation is variable, even in the same leaf, the lower veins now being united, now free.

To this species I now refer a number of specimens from Southern Brazil. Among these are some that perfectly agree with the Bolivian type, while others are more thin-leaved with the basal veins rather constantly united. A majority of the specimens were named *Dr. patens* var. *decrescens* by ROSENSTOCK (Hedwigia 46: 114. 1907) and *Aspidium conspersum* Fée, Cr. vasc. Br. 1; 143. 1869 (vix SCHRAEDER) is apparently the same. Some of these specimens are very large, having pinnæ up to 20 cm long by 2 cm wide, in general habit very much resembling *D. patens*, from which species they differ by creeping rhizome, basal scales (which resemble those of *D. mollis*) and the downwards narrowed lamina.

This form can be named var. *patentiformis* Ros. — (The specimens determined by me during these last years are named on the labels *Dryopteris patentiformis* Ros.)

Besides the specimens enumerated by ROSENSTOCK (loc. cit.) I have among others seen the following, all from Brazil:

Minas Geraes, Caldas, MosÉN nr. 2172 (H, L, Rg, S), 2173 (Rg); Lagoa Santa, WARMING nr. 788 (H); Serra de Ouro Preto, SCHWACKE nr. 10231 (C); Itaculúmy, SCHWACKE nr. 14489 (C) — Rio, GLAZIOU nr. 2360 (H); BLANCHET nr. 2635 (H) — Sta. Catharina, Blumenau, HAERCHEN ed. ROSENSTOCK, Fil. austr. bras. exs. nr. 198 (Rg) — Paraná, Serra do Mar, DUSÉN nr. 3725 (C) — Rio Grande do Sul, Rio Pardo, C. JÜRGENS ed. ROSENSTOCK, Fil. austr. bras. exs. nr. 264 (B, C, R, Rg, W).

Another critical form is that named *D. parasitica* var. *procurrens* by ROSENSTOCK (Hedwigia 46; 131. 1907) and distributed by him in his Fil. austr. bras. exs. nr. 356 (R, Rg). It is of a thinner texture, with a more slender rachis and the veins constantly anastomosing. It may be a form of *D. mollis* with creeping rhizome, but I am inclined to consider this and several other critical forms all being forms of a single, very variable species, *D. Bangii*.

199. *Dryopteris urens* Ros. in Fedde, Repert. 4: 5. 1907, C. Chr., Vid. Selsk. Skr. VII. 4: 332. 1907, with fig.

Type from Uruguay, Punta Ballena, ARECHAVALETA (R) and BERRO (CC). Resembles very much some of the thin-leaved forms referred to under the

preceding species, it may perhaps be best known from its soft pubescence by long, whitish, shining hairs, which are said to burn. Under-surface and indusium glandulose, veins free.

200. *Dryopteris mollis* (Jacq.) Hieron. Hedwigia 46: 348. 1907.

Syn. *Polypodium molle* Jacq. Coll. 3: 188. 1789; Ic. pl. rar. tab. 640.

Dryopteris parasitica O. Ktze.; C. Chr. Ind. 282 with synonymy.

Nephrodium quadrangulare Fée, Gen. 308. 1850—52.

Aspidium purusense Christ, Hedwigia 45: 192. 1906.

Dryopteris Limonensis Christ, Fedde, Repert. 8: 18. 1910.

JACQUIN described his species from specimens cultivated in the gardens of Schoenbrunn and I have seen a leaf therefrom in Herb. Sw. (S). In Ark. för Bot. 9¹¹: 26—28, fig. 4—5. 1910 I have pointed out that *Pol. parasiticum* L. from China can not be identified with *P. molle* Jacq., which is that “*molle*” form occurring in the West-Indies and West Africa and later on described as *Aspidium violascens* Link, characterized by the downwards narrowed lamina.

D. mollis is closely allied to *D. normalis*; in size, texture, pubescence, structure and colour of the scales of the rhizome, sori and other characters the two species are much alike, but the rhizome of *D. mollis* is obliquely erect or short-creeping, not wide-creeping, in the typical forms the lower 2—3 pairs of pinnæ are considerably shortened and the basal pair of veins is truly anastomosing. Still the species varies with regard to the two last named characters. The typical West-Indian form is rather small, thin-leaved and soft-hairy, the lamina gradually attenuate downwards, the basal pair of veins anastomosing; in some continental forms the lamina is not at all narrowed and, as a rule, larger, but otherwise they agree with the type. I have tried to separate such forms as varieties or species but I have failed to find good distinguishing characters, and now I prefer to refer all the different forms to one species, *D. mollis*.

D. mollis is in America distributed from Alabama to Paraguay and Argentina, thus of the same range as *D. patens*. In the Old World very similar forms occur, which probably must be referred to the same species. The West African form, so common in Madeira, is exactly identical with the West-Indian form; the Polyneesian form (*Pol. nymphale* Forst.) is somewhat different but scarcely more so than the American forms differ from each other.

Below I enumerate a part of the specimens examined, especially such which were distributed with numbers. Some of the Costa Rican specimens were determined by CHRIST as *Aspidium prominulum* Christ, Bull. L’Herb. Boiss. 4: 656. 1896; Bull. Soc. bot. Belg. 35: 212 = *Dryopteris prominula* C. Chr. Ind. 286, but they do not at all agree with the description; the species was founded on PITTIER nr. 8198, which I have not seen; judging from the description it belongs to *Goniopteris*. — *Asp. purusense* Christ from Amazonas (HUBER nr. 4459) is a rather common, large form with the upper basal segments enlarged and lobed.

Dryopteris Limonensis Christ, from Costa Rica, A. et C. BRADE nr. 273 is, judging from the description, the typical form of *D. mollis* with the lower pinnæ reduced.

- West-Indian Islands: Trinidad, FENDLER nr. 17 (B, W); hb. Trin. Bot. Gard. nr. 327 (W) — Tobago, EGGERS nr. 104 (C) — Grenada, R. V. SHERRING nr. 18 (W); BROADWAY nr. 3751, 3770 (RB) — St. Vincent, EGGERS nr. 6565 (C); H. H. SMITH nr. 859 (W) — St. Lucia, LEE (W) — Martinique, L. HAHN nr. 466 (B); Père DUSS nr. 1586, 4130, 4153 (W), 4424, 4426, 4427 (C), 4616 (W) — Dominica, F. E. LLOYD nr. 690, 721 (W) — St. Thomas, EGGERS nr. 10 (C, H, W) et alii (H) — St. Jan (H) — Porto Rico, UNDERWOOD and GRIGGS nr. 909 (W); GOLL nr. 304 (W); PERCY WILSON nr. 250 (W); SINTENIS nr. 62 (S), 1792 (C, W) — San Domingo, Sierra Palo Quemado, EGGERS nr. 1866 (B); WRIGHT, PARRY et BRUMMEL nr. 31 (W) — Haïti, WEINLAND nr. 73 (B) — Jamaica, MAXON nr. 1715 (= UNDERWOOD nr. 2679), 2364 (W); UNDERWOOD nr. 1541 (W) — Cuba, Oriente, WRIGHT nr. 1001 pt. (B, S, W); Santiago, POLLARD, E. et W. PALMER nr. 63 (W); Pinar del Rio, PALMER et RILEY nr. 135 (H, W), 299, 516 (W).
- U. S. A.: Alabama, Hatchetigbee Bluff, Washington Co., HARPER nr. 130 (W); near Mobile, W. C. DUKES (W) — Louisiana, Lafayette Co., A. B. LANGLOIS (W).
- Mexico: Jalisco, near Guadalajara, PRINGLE nr. 8793 (B, H, S, W) — Tepic, E. PALMER nr. 1939, 1940 (W); J. N. ROSE nr. 3325, 3326 (W); F. H. LAMB nr. 592 (W) — Sinaloa, Rosario, F. H. LAMB nr. 494 (W) — Orizaba, BOURGEOIS nr. 2363 (B, H, S, W).
- Guatemala: Dept. Escuintla, Concepcion, J. DONNELL SMITH nr. 2458, 2738 (W); Cubilquitz, v. TÜRKHEIM nr. 8357 (C).
- Honduras: San Pedro Sula, C. THIEME ed. DONN. SMITH nr. 5672 B (W); Rio Permejo, C. THIEME ed. DONN. SMITH nr. 5698 (W).
- Costa Rica: environs d'Alajuela, PITTIER nr. 542 (C); Terraba, PITTIER nr. 3559 (W); Ile Cocos, PITTIER nr. 12363 (C, W); Ujarra, PITTIER nr. 10566 (C, W) — Navarra, WERCKLÉ (C) — Atirro, DONNELL SMITH nr. 5085 (W) — Cartago, J. J. COOPER ed. DONN. SMITH nr. 6027 (W) — Tuis, TONDUZ nr. 11331 (C); Las Vueltas, TONDUZ nr. 12826 (W), 14582 (C) — San José, COOK and DOYLE nr. 408 (W); ALFARO nr. 16898 (RB); BRADE nr. 416 (R) — Sabanilla de los Granados, ALFARO nr. 16227 pt. (W) — Rio Sombres, BIOLLEY nr. 1 (C); Tablazo, BIOLLEY nr. 64 b (C) — Rio Tiribi, BIOLLEY nr. 100 pt. (C, CC).
- Panama: Boca de Cupe and Cana, R. S. WILLIAMS nr. 851, 852 (W) — Bocas del Toro, HART nr. 51 (W); Chiriqui, HART nr. 251 (W) — E. OTTO nr. 17 (B).
- Colombia: Sta. Marta, H. H. SMITH nr. 1001, 1003 (C) — STÜBEL nr. 372 (B).
- Venezuela: Caracas, MORITZ nr. 114 (B) — Puerto Cabello, KARSTEN nr. 143 (B) — La Guaira, ROBINSON and LYON (W).
- Guiana: Cayenne, LEPRIEUR nr. 26 (B, W) — Cagnai, LEPRIEUR nr. 8 (H) — APPUN nr. 4 (B).
- Ecuador: Balao, EGGERS nr. 14179 (W).
- Peru: Tarapoto, SPRUCE nr. 4039 (RB); rather glandulose throughout = var. *glanduligera* Ros. Fedde, Rep. 7: 304. 1909).
- Galapagos Islands: Charles Island, A. LEE (W — doubtful).
- Brazil: Amazonas, Alto Purus, HUBER nr. 4459 (C) — Bahia, SALZMANN (H); BLANCHET (W) — Pará, J. V. HERNANDEZ nr. F (W) — Rio, MOSÉN nr. 48¹/₂ (Rg, S); REGNELL nr. 251 (Rg); GLAZIOU nr. 10184 (H) — Minas Geraes, Caldas, MOSÉN nr. 2190, 2191 (Rg), 2192 (H, Rg, S), 4615 (Rg); REGNELL nr. 1450 (Rg, W); Casa da Pedra, SILVEIRA nr. 258 (C) — Lagoa Santa, Warming nr. 784 (H) — São Paulo, Campinas, A. HEINER nr. 522 (Rg) — Santos, MOSÉN nr. 3746 (Rg) — Rio Grande do Sul, Rio Grande, LINDMAN nr. A 843 (Rg, W); Excolonia Santo Angelo, LINDMAN nr. A 963 (Rg); Rio Pardo, C. JÜRGENS, Rosenstock, Fil. exsic. austr. bras. nr. 356 (R, Rg) — further numerous specimens from the southern states of Brazil in (R).
- Argentina: Misiones, Posadas, E. L. ERMAN nr. 4, 5, 6, 7 (Rg).
- Paraguay: Paraguari, LINDMAN nr. A 3785 (Rg); ad flum. Riacho Mbopi, LINDMAN nr. 1947 (Rg) — L'Assomption, BALANSA nr. 312 (S).

201. *Dryopteris gongylodes* (Schkuhr) O. Ktze. Rev. Gen. Pl. 2: 811. 1891;
C. Chr. Ind. 268.

Syn. *Aspidium (goggilodus)* Schkuhr, Kr. Gew. 1: 193 tab. 33 c. 1809.
Aspidium obtusatum Schkuhr 1806.
Nephrodium unitum Bak. Syn. Fil. 289 et auctt. plur.; Jenman, Bull.
Dept. Jamaica n. s. 3: 189. 1896.
Aspidium Pohlianum Pr. Del. Prag 1: 173. 1822.
Goniopteris cheilocarpa Fée, Gen. 251. 1850—52.
Nephrodium paludosum Liebm. Vid. Selsk. Skr. V. 1: 275. 1849.
(For other synonyms see Index Filicum).

Type from Esseequebo.

In Herb. SWARTZ (S) I have seen a specimen no doubt of the type collection, named by SWARTZ *Aspidium obtusatum*, under which name it was figured by SCHKUHR on his plate 33 c. Later on SCHKUHR renamed the species acknowledging that it were not the original *A. obtusatum* Sw. Most pteridologists have called the species *Aspidium* (resp. *Nephrodium*) *unitum* identifying it with *Polypodium unitum* L., but the species of LINNÆUS is said also to be the same as *Nephrodium cucullatum* Bl., and it is, therefore, best to let SCHKUHR's name stand for our species, also because it was applied to the most common American form.

D. gongylodes is a well-known bog-fern, found in almost all tropical and subtropical regions. Its long creeping, black and nearly naked rhizome, its papyraceous to coriaceous lamina, which is not narrowed below, its rather distant and narrow pinnæ with obtusely rounded lobes, its close veins with the two basal ones always truly united, make it easily recognizable from the allied species of this section, of which it is the nomenclaturic type. It varies mainly in pubescence, and one can refer most of the American forms to two varieties, which, however, are connected with intermediate forms:

1. var. *glabra* Mett. As a rule quite hairless but often rather scaly on the costæ and costulæ beneath and most often more or less glandulose by large, capitate glands. These glands are often very numerous on the costulæ and veins and indusia and are here sessile, and in some forms they also are found on the receptacle, intermixed with the sporangia, but here they are stalked. In the common South Brazilian form described as *Aspid. Pohlianum* Pr. (t. sp. orig. Herb. PRESL), which is often exindusiate, these glands are, as a rule, very numerous, but they are also to be found in several specimens from the West Indies and Florida.

2. var. *hirsuta* Mett. Lower surface and indusia rather hairy by short hairs; glands absent or some few are found, mostly among the sporangia; the receptaculum is sometimes also hairy. This form occurs in Southern Brazil, Mexico and in the Lesser Antilles, while the specimens from the Larger Antilles, Florida and Central America mostly belong to var. *glabra*, which is the typical form as figured by SCHKUHR. In size and general habit the two varieties quite agree. They are

rather small, the pinnæ about 10 cm long by 1 cm wide with 6—8 pairs of tertiary veins. A more different form occurs in Southern Brazil and adjacent countries. I call it

var. **longipinna** nov. var.

It is much larger than the type, having pinnæ up to 40 cm long by 30 cm wide with about 15 pairs of veins; further it differs by its thinner texture and scarcely raised veins; it is hairless and, as a rule, also eglandulose.

D. gongylodes is found in America from Florida to Argentina and from Mexico to Panama, while it apparently is unknown from the South American Andes. In the Old World it occurs in about all tropical and subtropical countries, extending to Japan and Korea. The South African form (*Aspid. Ecklonii* Kze.) is nearly quite identical with the American var. *glabra* and similar forms are found in Asia. The Australian and Polynesian form originally described as *Nephrodium propinquum* Rr. B., of which I have seen an authentic specimen (S), corresponds to the var. *hirsuta*, but it may perhaps be considered a different species.

American specimens seen:

Florida: various localities; CURTISS nr. 3740 (B, W), 6760 (S, W); UNDERWOOD nr. 276 (W); DONNELL SMITH (W); A. P. GARBER nr. 19 (W); MARY C. REYNOLDS nr. 187 (W).

West-Indian Islands: Guadeloupe, DUSS nr. 4058 (W) — Martinique, DUSS nr. 1587 (W) — Porto Rico, EGGERS nr. 22 (W), 457 (C); SINTENIS nr. 6642 (C, S, W) — Jamaica, near Cinchona, HART (W); UNDERWOOD nr. 156 and 3104 (W); Salt Pond, CLUTE nr. 241 (W); Content Gap, D. WATT nr. 9 (RB) — Cuba, WRIGHT nr. 1100 (S, W); Pinar del Rio, PALMER and RILEY nr. 331 (W).

Mexico: San Antonio Huatusco, LIEBMANN (H = *Nephrod. paludosum* Liebm. = var. *hirsuta*).

Costa Rica: Marais de Matina, PITTIER nr. 10266, 10268 (C, W) — Cañas Gardas, PITTIER nr. 11204 (W) — Rio Surubres, BRADE nr. nr. 420 (R).

Guiana: Surinam, WEIGELT (Herb. Presl) — French G., SAGOT nr. 753 (S).

Brazil: Rio, GLAZIOU nr. 2362, 2363 (H) — S. Paulo, Santos, MOSÉN nr. 3060 (Rg, S); Campinas, MOSÉN nr. 3938 (H, Rg, S) — Paraná, Icarehý, DUSÉN nr. 6646 (Rg) — S. Catharina, Blumenau, HAERCHEN ed. ROSENSTOCK, Fil. Bras. austr. nr. 88 (Rg, W).

Paraguay: Guarapí, BALANSA nr. 2193 (H) — Asunción, ANISITZ (S) — Central Paraguay, TH. MORONG nr. 250 (W).

Argentina: Misiones, Posadas, EKMAN nr. 9 (Rg) — Jujuy, Quinta, ROB. E. FRIES nr. 255 (Rg).

var. **longipinna**.

Brazil: Rio Grande do Sul (W) — San Luzia de Rio das Velhas, SCHWACKE (C).

Uruguay: Puerto del Sauce, BERRO nr. 1250 (CC) — Nueva Palmira, ARECHAVALTA nr. 402 (C).

Paraguay: Santa Barbara, BALANSA nr. 314^a (S).

Species of doubtful position.

202. *Dryopteris Martini* C. Chr. Index 276. 1905. — Fig. 26.

Syn. *Nephrodium connexum* Kuhn; Bak. Fl. bras. 1²: 489. 1870; Syn. Fil. 502. Type from Cayenne, leg. MARTIN (B!).

I have seen only an imperfect specimen of this, which shows it being a very distinct species but of a very doubtful position. It is with the greatest doubt only I place it here under *Cyclosorus*; it could as well be referred to *Steiropteris*. Still it does not resemble at all any species of *Steiropteris*, while it in general habit closely resembles certain forms of *D. oligophylla*. It differs from all American species of *Cyclosorus* by the presence of a callose aërophore at the base of the pinnæ beneath and by the sporangia being deciduously setose.

Rachis quadrangular, finely puberulous by hamate, deciduous hairs. Pinnæ up to 30 cm long by 3 cm broad, papyraceous; costæ above somewhat strigose, costæ and costulæ beneath setose by spreading, stiff, unicellular hairs; scales and glands none. Margins cut about two-thirds of the way down into falcate, acute segments with the edges somewhat revolute. Veins simple, about 16 to a side, those of the lower 4—5 pairs connivent to sinus, below which is a narrow, cartilagineous and hairy membrane but no keel extending to the costa as in *Steiropteris*, the lowermost pair of veins generally truly united in the leaf-tissue and sending an excurrent branch to the membrane. Sori inframedial, furnished by a subpersistent, reddish, slightly setose indusium. Sporangia with 1—2 short, deciduous hairs. — I have not seen the lower pinnæ and can not say whether the basal lower segments are reduced or obsolete as in *D. oligophylla*.

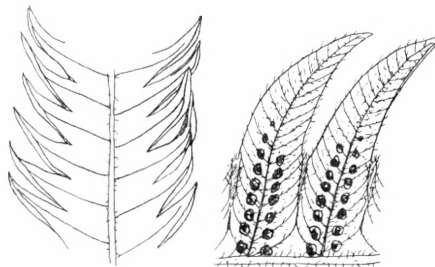


Fig. 26. *D. Martini* C. Chr. Fragment from the middle of a pinna, $\times \frac{4}{5}$; segments $\times 1\frac{1}{2}$ (orig.).

Unknown species of § *Cyclosorus*.

1. *Aspidium albicaule* Fée, 8 mém. 102. 1857 — Mexico, SCHAFFNER nr. 245.
2. *Aspidium conspersoides* Fée, l. c. 105 — Mexico, Orizaba, SCHAFFNER nr. 335 and 463.
3. *Aspidium pallidum* Fourn. Mex. Pl. 1: 96. 1872; *Dryopteris chlorophylla* C. Chr. Ind. 257 — Mexico, Orizaba, BOURGEOU nr. 2779 bis. These three are all, I believe, forms of what I have called *D. augescens* var. *puberula*.
4. *Aspidium Orizabae* Fée, l. c. 104; *Dryopteris Orizabae* C. Chr. 281 — Mexico, Orizaba, SCHAFFNER nr. 464. Probably *D. oligophylla* var. *pallescens*.
5. *Aspidium pauper* Fée, l. c. 103 — Martinique, Mll. RIVOIRE. A small form of *D. patens*?
6. *Nephrodium oppositum* Fée l. c. 108 — Martinique, Mlle. RIVOIRE. Probably *D. mollis*.

8. *Nephrodium paucijugum* Jenman, Journ. Bot. 1886: 270; *Dryopteris chartacea* C. Chr. Ind. 257 — Jamaica, SHERRING.

On this see MAXON Contr. H. S. Nat. Herb. 10: 489. I believe that the type-specimen of it is at Kew, and I have seen it. It is sterile and undeterminable. It is not improbable that JENMAN was right in considering it a young plant of *D. oligophylla*.

Subgenus 8. **Leptogramma** J. Smith emend. C. Chr.

Biolog. Arbejder tilegnede Eug. Warming pag. 82. 1911.

A small group, in America represented by three species. I confine it to include the species of *Gymnogramme* § *Leptogramma* of Syn. Fil. only having more or less soft-hairy lamina, oblong to linear, exindusiate sori and setose sporangia. The lamina is not or slightly narrowed downwards, the rhizome generally long-creeping, at apex furnished with few hairy scales. The hairs of most species are long, thin, pluricellular. In general habit and venation the species resemble mostly species of *Cyclosorus*, thus the American *D. pilosa* and *D. dasyphylla*, while the third *D. polypodioides* comes very near to species of *Goniopteris*, but I have not found stellate or forked hairs, which constantly are to be found in species of *Goniopteris*. — The typical species of *Leptogramma* is the common *D. africana* (Desv.) C. Chr. (*Gymn. totta* Schlecht.) from Africa and Asia.

Key.

1. Lamina soft-hairy by long pluricellular hairs, herbaceous.
2. Lamina gradually narrowed towards the apex, several of upper pinnæ confluent at base. Stipe glabrous. Mexico.
 203. *D. pilosa* (Mart. et Gal.) C. Chr.
2. Lamina upwards suddenly narrowed into a pinnatifid apex, lateral pinnæ all free at base; stipe as well as the whole leaf very hairy.
 204. *D. dasyphylla* C. Chr.
1. Lamina practically glabrous, membranous. Brazil.
 205. *D. polypodioides* (Ratti) C. Chr.

203. *Dryopteris pilosa* (Mart. et Gal.) C. Chr. Ind. 284. 1905.

Syn. *Gymnogramme pilosa* Mart. et Gal. Mém. Acad. Brux. 15: 27 tab. 4 fig. 1. Liebmann, Vid. Selsk. Skr. V. 1: 181 with description.

Type from Mexico: Orizaba, leg. GALEOTTI nr. 6167 and 6268 (Mus. Paris!).

The figure quoted above gives a good illustration of the common form of this characteristic species, which scarcely can be confounded with any other Mexican *Dryopteris*. In general habit it resembles forms of *D. normalis* or of *D. augescens*, but its generally less cut pinnæ, pluricellular hairs, linear to oblong, exindusiate sori and setose sporangia mark it at once. Veins simple, 3—6 to a side, the two basal ones running to sinus. GALEOTTI'S and LIEBMANN'S specimens belong to a small form having the most pinnæ confluent at base and scarcely incised more than halfway down to the costa, the lower ones often distinctly reduced. This form occurs at altitudes of 2—3000 m, while the species at lower altitudes grows considerably larger. I have seen specimens measuring 30 cm in length (lamina only) and 20 cm in breadth and having the pinnæ incised two-thirds of the way down. Such large forms are exactly intermediate between the typical form and the var. *procurrens*. — *D. pilosa* seems to be confined to Southern Mexico; I have seen the following specimens:

Chinantla, Depart. Puebla, LIEBMANN (H) — Puebla, ARSÈNE (RB, CC) — Jalisco, near Guadalajara, 5000', PRINGLE nr. 2589 (B, S, W), 9346 (W) — Morelos, Sierra de Tepoxtlán 7500', PRINGLE nr. 11265 (B, H, W) — Jalisco, at Río Blanco, ROSE and PAINTER nr. 7502 (W) — Mexico, SCHMITZ nr. 367 (B).

var. *procurrens* (Fée) Bak. Syn. Fil.

515. 1874. — Fig. 27.

Syn. *Gymnogramme procurrens* Fée, 8. mém. 78. 1857.

Gymnogramme pilosa var. *major* Fourn. Mex. pl. 1: 73. 1872.

Dryopteris pseudo-totta Christ, Bull. l'herb. Boiss. II. 7: 415. 1907.

Differs from the type by its broad (2—2½ cm) pinnæ, which are deeply cut, most of them free at base, the lower ones not reduced, often shortly petiolate. Veins 6—10 to a side, often furcate, somewhat prominent beneath.

— Forêt de la deserta Vieja, BOURGEOU nr. 921 (H, S) — Ixtacihuatl, PURPUS nr. 1603 (W) — Oaxaca, Cerro San Felipe, GONZÁLEZ et CONZATTI nr. 711 (W) — Chiapas, S. Cristobal, G. MUNCH nr. 5 and 23 (C).

204. *Dryopteris dasyphylla* C. Chr. Ind. 260. 1905.

Syn. *Gymnogramma villosa* Link, Hort. Berol. 2: 51. 1833; Fil. sp. 137.

Based on plants cultivated in Hort. Berol. I have seen LINK'S type specimens (B) and several others, but all from cultivated plants. In handbooks of ferns it is said to be a Brazilian species, but I have never seen a specimen from Brazil. LINK, however, says (in Fil. sp. 137): "Hab. in provincia Caracas, Brasilia?" It has, I think, never been stated, where the species grows wild.



Fig. 27. *D. pilosa* (M. et. G.) C. Chr. var. *procurrens* (Fée) Bak, — Pinna $\times \frac{1}{5}$; segments $\times 1\frac{1}{2}$.

D. dasyphylla is closely related to *D. pilosa* var. *pubescens* and I have been inclined to consider it the same plant; still it is much more hairy, the lamina upwards suddenly narrowed into a pinnatifid apex and with 6—8 pairs of opposite or subopposite, sessile or very short-stalked pinnæ, about 8 cm long by $2\frac{1}{4}$ — $2\frac{1}{2}$ cm wide, the lower ones not reduced but narrowed towards their base, all cut about halfway down into close, broad subacute segments. Veins 6—7 to a side, simple. Sori short, often nearly round, the sporangia setose. Rachis, costæ and veins of both sides with many long, soft, pluricellular hairs.

205. **Dryopteris polypodioides** (Raddi) C. Chr. Ind. 285. 1905.

Syn. *Ceterach polypodioides* Raddi, Opusc. Sci. Bologn. 3: 284. 1819; Pl. Bras. 1: 10 tab. 22.

Gymnogramme polypodioides Spr.; Bak. Syn. Fil. 377.

Type from Brazil, Rio, RADDI (not seen). The following specimens seen are all from the mountains of Rio and are very uniform. MOSÉN nr. 2656 (H, Rg, S); GLAZIOU nr. 7252 (B, H); RATHBUN (W); U. S. Explor. Expedition 1838—42 (W); SELLOW (B).

In colour, cutting and shape of pinnæ very similar to *D. monosora* of the subgenus *Goniopteris* and also resembling *D. alsophilacea* of the subgenus *Ctenitis*, still very different by the oblong to linear sori and the setose sporangia. The creeping rhizome is naked and the whole leaf practically glabrous, only the costæ and costulæ are finely downy beneath. Lower pinnæ with a short, cuneate, entire base, acuminate, at both sides equally incised about $\frac{2}{3}$ of the way down to the midrib into broad, obtuse, subfalcate segments; veins about 10 to a side, the lower two running to the sinus.

Subgenus 9. *Goniopteris* (Presl) C. Chr.

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A large subgenus including about sixty good species and not closely allied to other *Dryopterides*. Its best and most constant character is the presence of unicellular, forked or stellate hairs. Such hairs are to be found always on the scales of the rhizome and lower part of the stipe and in most species they also cover the rachis, especially upwards and above, and the costæ beneath. In some species (*D. nephroides* and its relatives) the rachis is very densely but very shortly pulverulent by stellate hairs, in others (*D. sclerophylla*, *D. asterothrix*, *D. reptans* and others) the surfaces (veins and leaf-tissue) bear minute hairs with horizontal branches. The stellate hairs are, as far as I have found, never sessile but consist of a short stalk, which bears at the point 2—6 branches. The shape of the branches

seem to be rather confined within the species and it is to a certain degree of value as specific character. The branches can be short or long, simple or again forked (*D. Eggersii*), erect (*D. asterothrix*), horizontal or recurved (*D. glochidiata*). Besides stellate or forked hairs simple, unicellular, longer hairs occur in most species; some few species are practically glabrous (*D. vivipara*, *D. paucipinnata*), others densely pubescent throughout (*D. curta*, *D. Ghiesbreghtii*). The longer hairs are in most species confined to rachis, costæ and margins; generally the rachis bears as well stellate as simple hairs. Scales are, as a rule, few and mostly confined to rhizome and lower part of the stipe; rarely small, stellate-pubescent scales are also found on rachis and costæ beneath (*D. monosora*, *D. lugubris*). Glands as well as aërophores are always absent.

The pubescence is the main character of the subgenus, but the species show besides other characteristic common features, which can not be described so clearly as to be understood easily by others. Most species are dark-green or greyish-green, membranous or chartaceous, rarely thinly herbaceous or rigidly coriaceous, not much divided, the lamina entire, pinnatifid, pinnate or bipinnatifid. Bipinnate or decompound species I have not seen. Several species, perhaps the majority, are proliferous by buds on the rachis or the rachis is prolonged and rooting at the apex. The species of the section *Eugoniopteris* have impari-pinnate lamina. These two characters, proliferous leaves and impari-pinnate lamina, so common within *Goniopteris*, are unknown or, at best, very rare in all other subgenera.

With regard to venation the species vary not a little, still a certain uniformity can be pointed out. The venation is in correlation to the degree of cutting. In deeply cut pinnæ the veins, which nearly always are simple, are all free with those of the basal pair running to the sinus (f. inst. *D. scabra*), but more often they are connivent to sinus i. e. the lower 1—4 pairs of veins are upcurved and run side by side to the sinus, below which they are very often separated by a cartilaginous membrane. It is often difficult to state whether the veins are connivent or truly anastomosing, i. e. two veins being united into a single ex-current branch (*nervatio Goniopteridis*). In several species both kinds of venation can be found in the same leaf. Seen from the underside the veins often appear to be united, while they, seen from above, are found to be connivent but running very closely side by side. In several species the lower veins (1—3 pairs) are constantly united, while other species (f. inst. *D. nephrodioides*) are very variable in venation, some forms having free, others of the same species anastomosing veins. Within the second action, *Eugoniopteris*, we find an unbroken row from free-veined forms to *D. Ghiesbreghtii* and *D. meniscioides*, the venation of which is perfectly meniscoid.

The species are partly indusiate, partly exindusiate. Large indusia are rare (*D. paucipinnata*, *D. venusta*), in most species the indusia are small and more or less setose by simple or forked hairs, often very small and only seen in the young sori. In some species the receptacle bears long hairs between the sporangia; these

hairs are sometimes mistaken for ciliate indusia. The sporangia of several species are setose by simple or forked hairs. In *D. asplenioides* and others the head of the sporangium is glabrous while its pedicel is furnished with a single, stiff hair.

Goniopteris is a very distinct subgenus, or, I firmly believe, a very natural genus, not nearly related to the other subgenera, *Meniscium* excepted. The relation between *Goniopteris* and *Meniscium* will be explained under the latter. Between the sixty species dealt with below there are, however, two, *D. macrotis* and *D. semihastata*, the position of which as members of *Goniopteris* is rather doubtful. It is possible that these two species belong to *Cyclosorus*. I have not been able to find in the specimens seen stellate hairs, still they agree in colour and texture with *Goniopteris* rather than with *Cyclosorus*. Two other species, *D. glandulosa* and *D. Fendleri*, which resemble very much species as *D. nicaraguensis* and *D. megalodus*, I have referred to *Steiropteris*; they differ from *Goniopteris* in several minute characters.

All the species enumerated below are exclusively American. The subgenus is represented in the Old World by two species only, as far as I know, *D. silvatica* (Pappe et Raws.) C. Chr. from South Africa and *D. prolifera* (Retz.) C. Chr. from Africa, Asia and Australia. The American species can be divided into two rather natural sections:

1. **Asterochlaena.** Lamina upwards gradually narrowed into a pinnatifid apex.
2. **Eugoniopteris.** Lamina terminating in a terminal pinna resembling the lateral ones.

Under the latter group I unite into a small group, *Microdictyon* Fée, those species having meniscioid venation and connecting *Goniopteris* with *Meniscium*. Between the two sections no absolute limit is to be found.

Key.

1. **Asterochlaena.** Lamina entire bipinnatifid, upwards gradually narrowed into a pinnatifid apex.
2. Lamina entire, pinnatifid or with some few free pinnæ below.
3. Lamina without free pinnæ below or casually with a single pair of small free auricles.
4. Lamina lanceolate, crenate or broadly serrulate, scarcely 2 cm broad, shortly cuneate at base; midrib, veins beneath and indusium setose by simple hairs.
5. Lamina entire or crenate. 206. *D. Cumingiana* (Kze.) O. Ktze.
5. Lamina regularly and broadly serrulate or lobed
207. *D. Francoana* (Fourn.) C. Chr.
4. Lamina broadest above the middle, often irregularly pinnatifid, long and gradually narrowed downwards. Costa, veins beneath and indusium stellato-puberulous
210. *D. scolopendrioides* (L.) O. Ktze.

3. Lamina pinnate below but rarely to the middle.
4. Midrib, veins beneath and indusium setose by long, simple hairs. Stellate hairs few.
5. Free pinnæ entire or subentire, not auricled at the upper base.
6. Free pinnæ in 1—2 pairs, auriculiform, $\frac{1}{2}$ —1 cm long
208. *D. Skinneri* (Hk.) O. Ktze.
6. Free pinnæ several, 2—4 cm long.
7. Upper surface (costæ excepted) glabrous. Free pinnæ broadly adnate to rachis. Veins rarely truly united.
209. *D. Levyi* (Fourn.) O. Ktze.
7. Upper surface finely pubescent. Lower free pinnæ sessile with free base. Lower pair of veins often united. 212. *D. Peripae* (Sod.) C. Chr.
5. Pinnæ lobed, auricled at the upper base.
222. *D. Jamesoni* (Hk.) C. Chr.
4. Midrib and veins beneath stellato-puberulous; indusium small, stellato-pubescent, or none.
5. Free pinnæ small, entire, the lower gradually reduced downwards.
6. Free pinnæ close, numerous, gradually reduced to mere auricles. Leaf coriaceous. Most veins free.
213. *D. dissimulans* Maxon.
6. Free pinnæ few (1—4 pairs) and distant. Leaf membranous or chartaceous. Veins normally anastomosing and forming low meshes along the midrib of the lamina.
211. *D. guadalupensis* (Wikstr.) C. Chr.
5. Free pinnæ large, serrulate, lower ones not reduced.
227. *D. hastata* (Fée) Urb.
2. Lamina pinnate to short of the apex.
3. Pinnæ entire or serrulate or shallowly lobed, lobes as a rule broader than long.
4. Smaller species. Pinnæ seldom over 4 cm long, 1 cm broad.
5. Rachis and veins more or less stellato-puberulous, often also hairy by longer, simple hairs.
6. Pinnæ entire or faintly crenate, chartaceous. Veins normally free. Leaves not terminating in a long, rooting apex. Leaf-tissue nearly glabrous.
7. Pinnæ with a rounded, cordate base, oblong 1—1 $\frac{1}{2}$ cm long, $\frac{1}{2}$ cm broad 214. *D. cordata* (Fée) Urb.
7. Pinnæ with a pair of acute, spreading auricles at base, the lower ones gradually reduced.
215. *D. sagittata* (Sw.) C. Chr.
6. Pinnæ serrulate or lobed. Lower veins anastomosing.
7. Surfaces, especially the veins, more or less greyish-pubescent by stellate hairs.
8. Lamina herbaceous or membranous. Pinnæ short-stalked.
9. Sporangia glabrous. Leaves often prolonged into a long rooting tail. 216. *D. reptans* (Gmel.) C. Chr.
9. Sporangia setose by forked hairs. Leaf not proliferous. Surfaces densely pubescent by stellate and simple hairs. 217. *D. asterothrix* (Fée) C. Chr.

8. Lamina coriaceous. Pinnæ sessile.
218. *D. sclerophylla* (Kze.) C. Chr.
7. Surfaces hairy on the veins only, leaf-tissue glabrous, at least not pubescent by minute, stellate hairs.
8. Costæ beneath stellato-puberulous.
215. *D. sagittata* var. *tenebrica* (Jenm.).
8. Costæ beneath setose by simple hairs or glabrous.
9. Pinnæ short-stalked, rather deeply lobed; costæ beneath setose. West-Indian species.
10. Veins simple, often prominent beneath. Leaf-tissue glabrous; indusium setose.
219. *D. asplenioides* (Sw.) O. Ktze.
10. Veins often forked. Leaf-tissue pubescent.
220. *D. bermudiana* (Bak.) Gilb.
9. Pinnæ sessile. South-American species.
10. Lamina terminating in a long pinnatifid apex. Rachis and costæ beneath rather setulose; upper surface pubescent.
11. Pinnæ not auricled at base.
212. *D. Peripae* (Sod.) C. Chr.
11. Pinnæ auricled at base, the basal ones reflexed.
12. Andes. Veins 2—3-jugate. Basal pinnæ reduced. 222. *D. Jamesoni* (Hk.) C. Chr.
12. Brazil. Veins 5—6-jugate. Basal pinnæ scarcely reduced.
223. *D. Warmingii* n. sp.
10. Lamina pinnate to short of the apex, practically glabrous throughout.
5. Stellate hairs none, but rachis, ribs and indusium setose by simple hairs. Pinnæ auricled at the upper base.
221. *D. semihastata* (Kze.) O. Ktze.
4. Larger species: pinnæ 8—15 cm long, $1\frac{1}{2}$ — $2\frac{1}{2}$ cm broad, broadly serrate. Rhizome not creeping.
5. Most pinnæ auricled at their upper base, all sessile, the lower ones reflexed. Stellate hairs few or none; upper surface strigose by adpressed hairs.
6. Under surface pubescent by short, non-adpressed hairs. Only the basal pair of pinnæ reflexed. Rachis with few stellate hairs. Pinnæ scarcely more than 5 cm long 223. *D. Warmingii* n. sp.
6. Under surface strigose by adpressed hairs. 2—3 pairs of pinnæ reflexed. Stellate hairs none. Pinnæ 8—15 cm long 224. *D. macrotis* (Hk.) O. Ktze.
5. Pinnæ not auricled. Stellate hairs on rachis and often on costæ beneath. Leaf-tissue generally glabrous.
6. Lower veins as a rule connivent to sinus, rarely united.
7. Most pinnæ sessile, lower ones much reflexed.
230. *D. paucijuga* (Kl.) C. Chr.
7. Most pinnæ stalked, lower ones scarcely reflexed.
228. *D. pyramidata* (Fée) Maxon.
6. Basal pair of veins normally united, or at least running side by side to the sinus.

7. Lamina terminating in a long, broad pinnatifid apex equal in length to the lower pinnate portion.
8. Upper surface minutely pubescent. Veins about 3-jugate, those of basal pair the anastomosing.
212. *D. Peripae* (Sod.) C. Chr.
8. Upper surface glabrous. Veins about 6-jugate, the lower 2—3 pairs alternately united.
227. *D. hastata* (Fée) Urb.
7. Lamina pinnate to short of the apex.
8. 2—3 pairs of veins alternately united. Pinnæ about 4 cm broad . . . 264. *D. leucophlebia* (Christ) C. Chr.
8. Only the two basal veins united, the following 2—4 connivent to sinus. Pinnæ rarely 2 cm broad.
9. Lower pinnæ not or slightly reflexed, more or less shortened.
10. Sporangia glabrous. No scales on costæ beneath. Veins 4—5-jugate. Jamaica.
225. *D. serrulata* (Sw.) C. Chr.
10. Sporangia setose by furcate hairs. Small scales on the costæ beneath. Veins 7—8-jugate. Brazil . . . 226. *D. anoptera* (Kze.) C. Chr.
9. Lower 2—3 pairs of pinnæ much reflexed, scarcely shortened . . . 231. *D. refracta* (A. Br.) O. Ktze.
3. Pinnæ incised $\frac{1}{3}$ of the way to the midrib (lobes longer than broad) or to a narrow wing to the costa.
4. Rachis and costæ beneath subglabrous or slightly pubescent by short, stellate hairs and a few longer, simple hairs, not densely pulverulent by stellate hairs or tomentose by simple hairs.
5. Branched hairs with erect or horizontal branches.
6. Rhizome erect or oblique. Pinnæ rarely incised to the middle.
7. Most pinnæ sessile.
8. Lamina terminating in a long, pinnatifid apex. Sporangia setose by branched hairs.
227. *D. hastata* var. *leptocladia* (Fée).
8. Lamina pinnate to short of the apex. Sporangia glabrous.
9. Lower pinnæ not reduced. Veins connivent, not united. Lobes oblique or falcate, close. Stipe in length equal to lamina.
10. Lamina not gradually tapering from base to apex. Pinnæ few (8—10-jugate).
11. Lower pinnæ with a short, cuneate, entire base, not much reflexed.
229. *D. magdalenica* Hieron.
11. Lower pinnæ lobed to the base, much reflexed 230. *D. paucijuga* (Kl.) C. Chr.
10. Lamina gradually tapering from base to apex. Pinnæ numerous (15—25 to a side), incised to or above the middle.
232. *D. gemmulifera* Hieron.

9. Lower 1—3 pairs of pinnæ more or less reduced. Basal veins often united. Lobes patent with open sinuses between. Pinnæ numerous. Jamaica.
10. Indusium small. Sori medial or infra-medial. Veins 6—8-jugate. Pinnæ rarely incised to the middle. 233. *D. usitata* (Jenm.) C. Chr.
10. Indusium large, glabrous. Sori supra-medial. Veins 10—12-jugate. Pinnæ incised above the middle. 234. *D. venusta* (Hew.) O. Ktze.
7. Most pinnæ short-stalked.
8. Veins all simple, the lower ones connivent to sinus, rarely united. Leaf-tissue glabrous. 228. *D. pyramidata* (Fée) Maxon.
8. Basal veins united and the upper ones often furcate. Both surfaces pubescent. 220. *D. bermudiana* (Bak.) Gilb.
6. Rhizome creeping. Brazilian species.
7. Pinnæ scarcely incised to the middle, their base truncate, hairy beneath; veins 6—7-jugate. 244. *D. Schwackeana* Christ n. sp.
7. Pinnæ incised above the middle, lower ones narrowed towards the base.
8. Rachis and costæ beneath without scales. Lower pinnæ sessile, lobed to the base.. 236. *D. scabra* (Pr.) C. Chr.
8. Rachis and costæ beneath with small scales. Lower pinnæ short-stalked with a short, entire, cuneate base 237. *D. monosora* (Pr.) C. Chr.
5. Rachis and underside with erect, anchor-shaped hairs. Basal veins united 247. *D. ancyrithrix* Ros.
4. Rachis and costæ beneath densely pulverulent by short, stellate hairs, which are often intermixed with longer, simple hairs, or, the latter predominating, densely tomentose.
5. Indusium hairy by simple hairs or glabrous. Leaf-tissue of both sides glabrous or hairy by simple hairs.
6. Indusium setose.
7. Andine species. Rhizome erect (always?). Rachis and costæ beneath without scales.
8. Rachis (and costæ beneath) without thick, long hairs, but densely stellato-pulverulent.
9. Veins 10—16-jugate, the basal ones connivent to sinus. Upperside (costæ excepted) glabrous.
10. Fertile pinnæ and segments not contracted; rachis not gemmiferous. Most pinnæ sessile 238. *D. Eggersii* (Hieron.) C. Chr.
10. Fertile pinnæ and segments contracted, remote. Rachis gemmiferous. Most pinnæ stalked 239. *D. biformata* Ros.
9. Veins 6—8-jugate, the basal ones truly anastomosing. Upperside shortly pubescent. 240. *D. equitans* (Christ) C. Chr.

8. Rachis and costæ beneath besides the mostly once branched stellate hairs clothed with thick hairs, which are often cleft at the point. Most or all pinnæ sessile.
9. Pinnæ 6—7 cm long by $1\frac{1}{2}$ cm broad, sessile, the lower ones reflexed and scarcely narrowed towards their base 241. *D. curta* Christ.
9. Pinnæ 10—14 cm long by $2\frac{1}{2}$ —3 cm broad, the lower ones not reflexed, narrowed towards their base.
10. Grass-green, thin leaved; only the basal pair of veins run to sinus; long hairs of rachis and costæ fewer, reddish.
242. *D. heterotricha* C. Chr. n. sp.
10. Grey-green, firm; 3—4 lower pairs of veins connivent to sinus; long hairs very numerous, thin, rarely reddish; rachis upwards very tomentose. 243. *D. lugubriformis* Ros.
7. South-Brazilian species. Rhizome creeping.
8. Pinnæ 4—6 cm long by $1\frac{1}{2}$ cm broad, scarcely incised to the middle. Rachis and costæ beneath without scales 244. *D. Schwackeana* Christ n. sp.
8. Pinnæ 15—18 cm long by 2—3 cm broad, incised above the middle. Rachis and costæ beneath with small scales 245. *D. lugubris* (Kze.) C. Chr.
6. Indusium glabrous 234. *D. venusta* (Kze.) C. Chr.
5. Indusium with stellate hairs, rarely absent. Underside throughout with scattered, minute, branched hairs.
6. Lamina rigidly coriaceous, narrowed downwards; pinnæ 4—8 cm long. Basal veins united. 218. *D. sclerophylla* (Kze.) C. Chr.
6. Lamina herbaceous or membranous; lower pinnæ not shortened, 10—25 cm long.
7. Branched hairs with 3—5 cm long, erect or horizontal branches. Sori medial, sporangia glabrous.
8. Veins 10—14-jugate, lower ones often united. No scales on rachis and costæ beneath.
248. *D. nephrodioides* (Kl.) Hieron.
8. Veins 15—16-jugate; scales on rachis and costæ beneath 245. *D. lugubris* var. *quadrangularis* (Fée).
7. Branched hairs of the underside erect, anchor-shaped (i. e. with 2—3 short recurved branches at the top).
8. Sporangia with similar hairs. Veins free, sori inframedial. Brazil 246. *D. glochidiata* (Mett.) n. sp.
8. Sporangia glabrous. Basal pair of veins united. Andes 247. *D. ancyrlothrix* Ros.
1. **Eugoniopteris.** Lamina pinnate-bipinnatifid with a terminal pinna, which in most species resembles the lateral ones, in others it is larger and often hastate, i. e. with one or two larger lobes below.
2. Pinnæ without aërophore beneath. Stellate hairs occur always on the scales of the rhizome and in most species also on rachis. Veins free or anastomosing.

3. Veins all free or the lower 1—3 pairs united and sending an excurrent vein towards the sinus; in some species the lowermost pair (rarely the two lower pairs) is meniscioid, i. e. the excurrent branch being interrupted before reaching the next pair of anastomosing veins.
4. Indusium persistent. Lower veins connivent to sinus, rarely truly united. Lower pinnæ mostly with a cuneate base (*D. biformata* excepted).
5. Sori near the margin.
 6. Lamina coriaceous, glabrous; pinnæ scarcely incised $\frac{1}{3}$. Indusium reniform, whitish, glabrous. 251. *D. paucipinnata* (Donn. Smith) Maxon.
 6. Lamina thinly membranous, hairy on the ribs; pinnæ incised about $\frac{1}{2}$. Indusia reniform, athyroid or asplenoid in the same pinna or even segment. 254. *D. Schaffneri* (Fée) C. Chr.
5. Sori medial.
 6. Basal pinnæ not cuneate at base; fertile pinnæ and segments contracted. 239. *D. biformata* Ros.
 6. Basal pinnæ with a long cuneate, entire base; fertile pinnæ and segments not contracted.
 7. Indusium small, setose. Veins 12—14. Andes. 249. *D. tristis* (Kze.) O. Ktze.
 7. Indusium large, nearly glabrous. Veins 9—11. South Brazil. 253. *D. cuneata* n. sp.
4. Indusium none or minute, rarely found.
5. Under surface without minute stellate hairs on costulæ and leaf-tissue.
 6. Lower 2—4 pairs of veins connivent to sinus, only occasionally the lowermost pair is united.
 7. Smaller plant; pinnæ 2—4 to each side, serrulate, densely warted on both surfaces. 258. *D. juruensis* n. sp.
 7. Larger with about 10 pairs of pinnæ, not or inconspicuously warted, more deeply cut.
 8. Lower pinnæ with a long cuneate, entire base, incised about halfway down; 2 pairs of veins connivent to sinus. Sori medial. 249. *D. tristis* (Kze) O. Ktze.
 8. Lower pinnæ lobed to the very base, scarcely incised to the middle; 3—4 pairs of veins connivent to sinus. Sori inframedial or about medial.
 9. Rachis upwards and costæ beneath densely tomentose; upperside strigose. 243. *D. lugubriformis* Ros.
 9. Rachis and costæ beneath glabrous or nearly so.
 10. Leaf papyraceous, light-green; costæ and costules prominent, stramineous. Lower pinnæ not reflexed.
 11. Pinnæ 2 cm broad, crenate or slightly lobed; veins 3—5 jugate. Rachis gemmiferous, glabrous. 256. *D. straminea* (Bak.) C. Chr.
 11. Pinnæ 3 cm broad, lobed halfway down, veins 12—18 to a side. Rachis minutely pubescent, not gemmiferous. 250. *D. nicaraguensis* (Fourn.) C. Chr.

10. Leaf thinner, dark-green; costæ and costules not stramineous. Pinnæ in very distant, opposite pairs, the basal ones reflexed.
252. *D. Fraseri* (Mett.) O. Ktze.
6. Basal pair of veins normally united; in most species the next 2—3 pairs of veins are connivent to sinus and often alternately anastomosing into a flexuose common-branch, which runs to sinus.
7. Pinnæ entire, serrulate or lobed but never cut $\frac{1}{3}$ to the costa. Basal veins upcurved and anastomosing under acute angles, the following pair as a rule also anastomosing.
8. Leaf practically glabrous; in some species the rachis and costæ beneath are minutely puberulous. Sporangia glabrous, or (in *D. obliterata*) deciduously setose.
9. Both surfaces densely warted. Pinnæ 2—4 to a side 258. *D. juruensis* n. sp.
9. Surfaces not warted. Several pairs of pinnæ.
10. Pinnæ entire or very shallowly serrulate. Basal veins spring out from the costule 1 mm above the costa.
255. *D. vivipara* (Raddi) C. Chr.
10. Pinnæ broadly serrate or lobed $\frac{1}{4}$ or a little more. Basal veins spring out from the base of the costule or the posterior one from the costa.
11. Only the lowermost pair of veins anastomosing, or all free. Rachis gemmiferous.
12. Veins 4—6 jugate, the two basal one as a rule not united and not reaching the sinus.
256. *D. straminea* (Bak.) C. Chr.
12. Veins 8—9 jugate, those of the basal pair united 257. *D. Göldii* n. sp.
11. At least 2 pairs of anastomosing veins. Rachis rarely gemmiferous.
12. Terminal pinna small, often abortive. Pinnæ few, wrinkled, 5—8 cm long. Veins 4—5-jugate.
260. *D. nigrescentia* (Jenm.) C. Chr.
13. Terminal pinna confluent with the upper lateral ones.
227. *D. hastata* (Fée) Urb.
13. Terminal pinna distinct.
259. *D. obliterata* (Sw.) C. Chr.
8. Lamina rather densely pubescent throughout beneath. Sporangia densely setose. 261. *D. Rolandii* n. sp.
7. Pinnæ incised to the middle or deeper. Only the basal pair of veins anastomosing under broad angles.
8. Costæ beneath puberulous by stellate hairs.
240. *D. equitans* (Christ) C. Chr.

8. Costæ beneath setose by simple hairs.
262. *D. tetragona* (Sw.) Urban.
5. Under surface with minute stellate hairs throughout, especially on costæ and costules, but also on the leaf-tissue.
6. Terminal pinna stalked, distinct. Pinnæ incised $\frac{1}{3}$ or deeper; as a rule the lowermost pair of veins only are anastomosing under a broad angle.
263. *D. megalodus* (Schkuhr) Urb.
6. Terminal pinnæ confluent with the upper lateral ones, which are adnate to rachis. Pinnæ broadly serrulate (lobes scarcely longer than broad). 2—3 pairs of alternately united veins. 264. *D. leucophlebia* (Christ) C. Chr.
3. *Microdictyon*. 3—10 pairs of meniscioid veins. Pinnæ entire or crenate, seldom shallowly lobed, mostly more than 4 cm broad.
4. Lamina beneath more or less soft-hairy.
5. Veins 6—8-jugate, the 3—4 lower pairs meniscioid. Sporangia when young setose. 265. *D. Poiteana* (Bory) Urban.
5. Veins 10—12-jugate, 8—10 pairs meniscioid. Sporangia glabrous. Lamina densely soft-hairy.
267. *D. Ghiesbreghtii* (Lind.) C. Chr.
4. Lamina glabrous. Meniscioid veins several.
5. Pinnæ narrowed from the middle to base, crenate or serrulate. 266. *D. meniscioides* (Liebm.) C. Chr.
5. Base of pinnæ subcordate. Pinnæ entire. 268. *D. ensiformis* n. sp.
2. Pinnæ with an acute or obtuse aërophore at the base beneath. Stellate hairs none. Several pairs of veins connivent to a cartilagineous membrane below the sinus, the opposite pairs not anastomosing, but two subsequent veins of the same side of the costule generally united near the membrane; see *D. glandulosa* and *D. Fendleri* under § *Steiropteris*.

1. *Asterochlaena* C. Chr.

Biolog. Arbejder tilegnede Eug. Warming 84. 1911.

206. *Dryopteris Cumingiana* (Kze.) O. Ktze. Rev. 2: 812, 1891 C. Chr. Ind. 260.

Syn. *Aspidium Cumingianum* Kze. Farrnkr. 1: 17 tab. 9 fig. 2. 1840.

Nephrodium Cumingianum J. Sm. Bot. Voy. Heral. 237 tab. 50. 1854.

Type from Panama, leg. CUMING nr. 1123 (Kew! a small leaf only).

Apparently a very distinct species, well figured on the plates quoted, still it is possible that it and the following species are forms of one species. *D. Cumingiana* is less hairy, the lamina faintly crenate and 1—2 veins generally joint alternately the excurrent branch from the united basal veins. It appears to be a rare species, which is not found in the large recent collections from Panama.

207. *Dryopteris Francoana* (Fourn.) C. Chr. *Biolog. Arb. tilegn. Eug. Warming* 84. 1911. — Fig. 28a.

Syn. *Aspidium Francoanum* Fourn. *Bull. Soc. Fr.* 19: 255. 1872.
Nephrodium stenophyllum Bak. *Journ. Bot.* 1884: 363.
Nephrodium Harrisoni Bak. *Ann. of Bot.* 5: 326. 1891.
Dryopteris Harrisoni C. Chr. *Ind.* 269. 1905.
Polypodium subintegrum Bak. *Journ. Bot.* 1877: 164.
Nephrodium subintegrum Sodiro, *Rec.* 54. 1883; *Cr. vasc. quit.* 263. 1893.
Dryopteris subintegra C. Chr. *Ind.* 296. 1911.

Type from Nicaragua: Chontales, leg. P. LÉVY nr. 506 (Herb. Cosson, Mus. Paris!).

Differs from the preceding species, its only near relative, by its regularly lobed lamina and by the basal veins being much ascending and not always truly united; also it grows much larger; I have seen leaves measuring 40 cm in length including the stipe, that is equal to lamina in length but generally the leaves are much smaller.

The erect or ascendent rhizome, which is nearly destitute of scales bears several (10—20) fasciculated leaves; young stipes furnished at base with a few small scales with some bi-trifurcate hairs at the margins, glabrous or very sparsely and minutely pubescent by stellate hairs, sulcate above. Lamina lanceolate, 1—1½ cm broad below the middle, tapering gradually to the acuminate point, at base short-cuneate, dark-green, papyraceous or subcoriaceous, ciliate, midrib above strigose by antrorse hairs, midrib and principal veins beneath setose by simple, rigid, patent hairs, otherwise glabrous, the margins incised regularly about 1/3 to the midrib into oblique, broad, obtuse or subacute lobes. Veins about 7-jugate, simple (or rarely furcate), the lower two pairs connivent to sinus, or, the two basal ones truly united and sending a branch to sinus. Sori inframedial, furnished with a sub-persistent, setose indusium. Sporangia glabrous.

D. Francoana is a very constant species. The numerous Central-American specimens seen are all alike and the Ecuadorian one (*P. subintegrum* Bak.) differs only by its somewhat thinner texture and smaller, deciduous indusia. BAKER referred *A. Francoanum* to *N. Skinneri* Hk. (*Syn. Fil.* 288), but later he described the present species as new. — Specimens seen:

Nicaragua: Chontales, LÉVY nr. 506 (Mus. Paris, Kew).

Costa Rica: Jiménez, DONNELL SMITH nr. 5097 (B, C, W); ALFARO nr. 153 (W), 16521 (C) — Tuis près Turrialba, PITTIER nr. 11236 (C, W) — Vallée de Durui, Talamanca, PITTIER nr. 9406 (C, W) — Chilamate, PITTIER nr. 7501 (W) — Carrillo, PITTIER nr. 1176 (W) — Llanuras de Santa Clara, DONNELL SMITH nr. 6898 (B, W), 6899 (W) — Forêts de Tsâki, TONDUZ nr. 9463 (W) — WERCKLÉ (C).

Ecuador: near S. Miguel, Peripa River, SODIRO (C = *P. subintegrum* Bak.).

208. *Dryopteris Skinneri* (Hook.) O. Ktze. 2: 813. 1891; C. Chr. *Ind.* 293.

Syn. *Aspidium Skinneri* Hook. *Ic. plant. tab.* 924. 1854.
Nephrodium Skinneri Moore; Bak. *Syn.* 287 (excl. syn.).

Type from Guatemala, leg. SKINNER (Kew!). — A nearly identical plant was collected in Ecuador, ad fluv. Bombonasa, by SPRUCE nr. 5293 (RB).

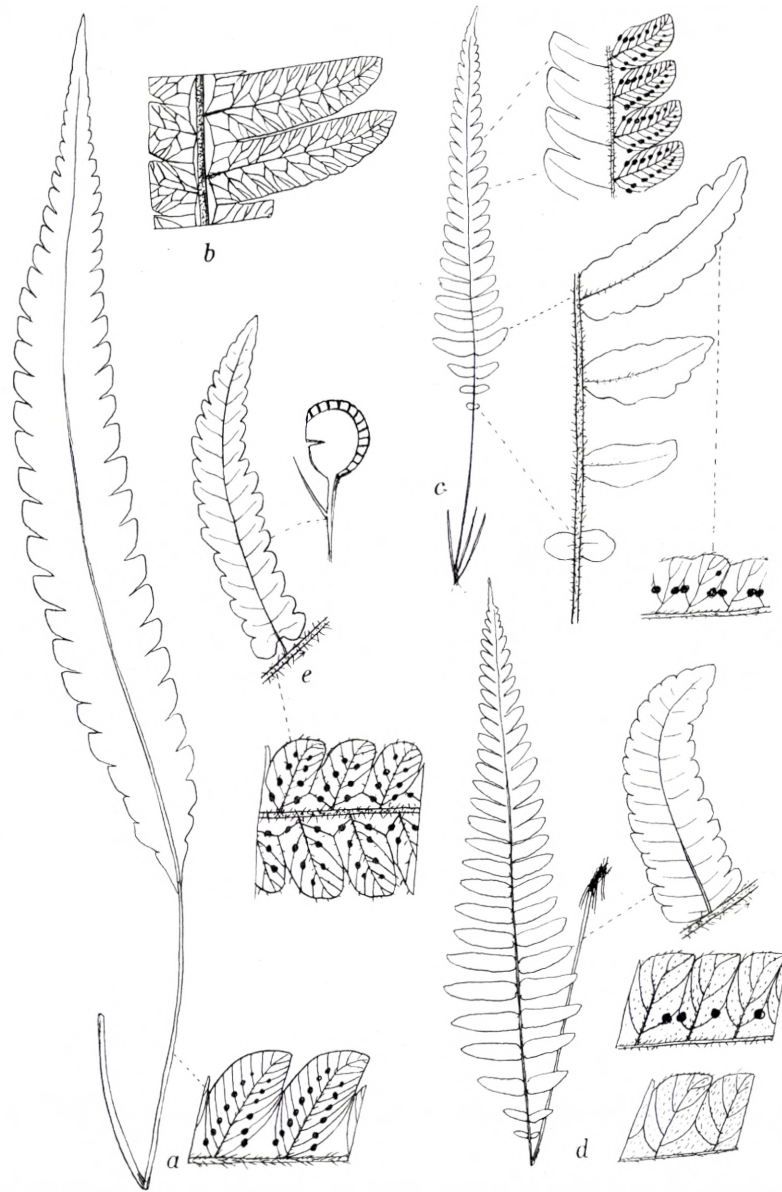


Fig. 28. *a. D. Francoana* (Fourn.) C. Chr. Entire leaf $\times \frac{4}{5}$ and fragment $\times 1\frac{1}{2}$ (orig.). — *b. D. guadalupensis* (Wikstr.) C. Chr.; fragment of a well-developed form, showing the venation, $\times \frac{4}{5}$. — *c. D. Levyi* (Fourn.) O. Ktze. Habit of a leaf $\times \frac{1}{6}$ with parts of it, $\times \frac{4}{5}$, and a fragment of the largest pinna, $\times 1\frac{1}{2}$ (orig.). *d. D. Peripae* (Sod.) C. Chr. Habit of a leaf $\times \frac{1}{6}$, a pinna $\times \frac{4}{5}$ and fragments seen from both surfaces, $\times 1\frac{1}{2}$ (orig.). — *e. D. asplenioides* (Sw.) O. Ktze. Pinna $\times \frac{4}{5}$, fragment $\times 1\frac{1}{2}$ and sporangium.

HOOKEER'S figure of this species is excellent and it is sufficient here to refer to that figure. The species is closely related to *D. Francoana*, agreeing in size, colour, texture and pubescence, still the midrib beneath is more distinctly stellato-puberulous but also setose by patent, rigid, simple hairs; lamina pinnatifid about $\frac{2}{3}$ of the way to the midrib and below it bears about 2 pairs of free, small pinnæ.

209. *Dryopteris Levyi* (Fourn.) O. Ktze. Rev. 2: 813. 1891. C. Chr.

Ind. 275. — Fig. 28 c.

Syn. *Aspidium Levyi* Fourn. Bull. Soc. Fr. 19: 255. 1872.

Nephrodium Levyi Bak. Syn. 502. 1874.

Type from Nicaragua: Chontales, leg. P. LÉVY nr. 463 (Herb. Cosson, Mus. Paris!, also Kew!).

Certainly closely related to *D. Skinneri*, to which species I have referred it previously as a variety, while I now think it is a valid species intermediate between *D. Skinneri* and *D. guadalupensis*. From the latter it differs by venation, pubescence, indusium and by its lamina being broadest below the middle; it agrees with it in size and general habit. It resembles *D. Skinneri* in pubescence, and the upper pinnatifid portion of a leaf is not to distinguish from a leaf of *D. Skinneri*. Still it is a much larger species: stipe 15—20 cm long, lamina 20—30 cm long, 5—8 cm broad below the middle, the larger leaves pinnate in the lower half; basal pair of pinnæ reduced, $\frac{1}{2}$ cm long, the following 3—4 cm long, $\frac{3}{4}$ —1 cm broad, adnate to rachis, obtuse or acute at the point, entire or crenate or the larger ones pinnatifidly cut about $\frac{1}{3}$ to the costa. Veins simple or furcate, in the larger pinnæ about 4 to each side of the lobe, the basal ones connivent to sinus, more rarely truly united. Lamina papyraceous, light-green, somewhat warted beneath. Ribs pubescent by long, simple, and short stellate hairs intermixed. Indusium setose by simple hairs.

210. *Dryopteris scolopendrioides* (L.) O. Ktze. Rev. Gen. Pl. 2: 813. 1891.

Syn. *Polypodium scolopendrioides* L. sp. 2: 1085. 1753 (non ed. II. 1585. 1763).

Aspidium scolopendrioides Mett. Aspid. nr. 235. var. 1. *incisa*. 1858.

Polypodium incisum Sw. Prod. 131, 1788; Fl. Ind. occ. 1640 (vide C. Chr. Ark. för Bot. 9¹¹: 22 tab. 3 fig. 1. 1910).

Aspidium incisum Gris. Fl. br. W. Ind. 694. 1864.

Nephrodium incisum Bak. Syn. Fil. 288. 1867; Jenman, Bull. Dept. Jam. n. s. 3: 141. 1896.

Dryopteris incisa O. Ktze. Rev. 2: 813. 1891; C. Chr. Index 272. 1905.

Polypodium praelongum Poir. Enc. 5: 521. 1804 (t. sp. orig. in Herb. LAMARCK).

Aspidium stenopteris Kze. Farnkr. 2: 48 tab. 120. 1849.

Nephrodium stenopteris Eat. Amer. Journ. Sci. II. 27: 199. 1859; Hk. sp. fil. 4: 64. 1862.

Goniopteris strigosa Fée, 11 mém. 59 tab. 15 fig. 1. 1866.

Nephrodium strigosum Jenm. Bull. Dept. Jam. n. s. 3: 141. 1896.

Type from San Domingo, PLUMIER Fil. tab. 91.

To this species I refer all specimens without free pinnæ but with the lamina narrowed below gradually into an entire or faintly toothed wing, $\frac{1}{2}$ cm broad. By this character it is always different from *D. guadalupensis* (Wikstr.) with which METTENIUS united it, and I have not found intermediate forms between the two species. In Ark. för Bot. 9¹¹ I have given my reasons for my considering *Pol. incisum* Sw. and *Aspidium stenopteris* identical with the true *D. scolopendrioides* (L.), which was based on PLUMIER tab. 91, but later by LINNÆUS confounded with my *D. guadalupensis* (Wikstr.). The confusion in the nomenclature of these two species was due to SWARTZ, who rightly distinguished the two species but unfortunately used the specific name *scolopendrioides* for the latter species and renamed the former *Pol. incisum*, and most authors have followed SWARTZ in his nomenclature. *D. scolopendrioides* varies mainly in size, especially in breadth, but it is otherwise a rather uniform species, which shows several good distinctive characters. The leaves are densely fasciculate on an erect or shortly oblique rhizome, sometimes 20–30 to a rhizome. The short stem (1–4 cm) is when young clothed with brown or blackish, stellato-pilose scales. Some of the leaves, which are normally sterile, are short and spreading, others up to 4 dcm long, erect and fertile and sometimes ending in a retuse viviparous apex with a rosette of small leaves. The lamina, which tapers gradually from the middle to both ends, is generally linear, ca. 3 cm broad at the middle, and varies from being deeply and broadly serrate to pinnatifid $\frac{1}{3}$ or $\frac{1}{2}$ of the way to the midrib with triangular, acute lobes, which are often very unequal in size, some of them being lengthened, 3–4 cm long. Texture more or less coriaceous, often very rigid. Stem, midrib and veins beneath generally densely stellato-pubescent by short multibranching hairs; upper side and leaf-tissue beneath as a rule glabrous, but the under-surface distinctly verrucose. Veins raised beneath, simple or rarely forked, the basal pair anastomosing. Sori supramedial in a single row — seldom in two rows — furnished with a small stellato-pilose indusium. Sporangia glabrous.

The common Cuban form (*A. stenopteris* Kze.) differs from the type by a longer stem and much lengthened middle segments with furcate veins, which in the largest forms are sometimes found anastomosing, and by its very long decurrent base of the lamina, but I can not consider that form different from the type even as a variety. *Pol. praelongum* Poir. is essentially the same, but its veins are more branched and the sori in the lengthened segments often biserial.

Specimens examined:

Haiti: Port au Prince, PICARDA nr. 385 (C) — STENGEL (B).

San Domingo: BALBIS (B). Petit Trou, Barabona, v. TUERCKHEIM nr. 2843 (B).

Jamaica: SWARTZ (S = *Pol. incisum* Sw.)

Cuba: Monte Verde, WRIGHT (W, B) — El Yunque Mt. near Baracoa, UNDERWOOD & EARLE nr. 1268 (W, C); POLLARD & PALMER nr. 163 (W) — Jaguey, EGGERS nr. 4887 (C, RB) — Josephina, north of Jaguey, Yateras, 575 m., MAXON nr. 4111, 4140 (W) — Monte Libano, 600 m., MAXON nr. 4258 — El Guama, Pinar del Rio, PALMER & RILEY nr. 393 (W, C, H).

211. *Dryopteris guadalupensis* (Wikstr.) C. Chr. Biolog. Arb. tilegn. Eug. Warming 84. 1911 (non O. Ktze.). — Fig. 28 b.

Syn. *Polypodium guadalupense* Wikstr. Vet. Akad. Handl. 1825: 435. 1826.

Polypodium scolopendrioides L. sp. ed. II. 1585. 1763 (non ed. I); Sw. Fl. Ind. occ. 1641 et auctt.

Aspidium scolopendrioides var. 2. *subpinnata* Mett. Aspid. nr. 235. 1858.

Nephrodium scolopendrioides Hk. sp. 4: 65. 1862; Hk. Bak. Syn. 288; Jenman, Bull. Dept. Jam. n. s. 3: 142. 1896.

Dryopteris scolopendrioides C. Chr. Index 291. 1905.

Polypodium domingense Spr. Syst. 4: 51. 1827 (t. spec. orig.).

Goniopteris affinis Fée, Gen. Fil. 250. 1850—52 (t. spec. auth.).

? *Goniopteris ferax* Fée, Gen. Fil. 250. 1850—52.

Aspidium asplenioides var. *portoricense* Kuhn & Christ, et var. *subpinnata* Krug, Engl. Jahrb. 24: 119. 1897.

Dryopteris asplenioides var. β *portoricensis* et γ *subpinnata* Urban. Symb. Antill. 4: 17, 18. 1903.

Type from Guadeloupe, leg. FORSSTRÖM (S!).

A variable species, especially in size and degree of cutting, but fairly constant in several characters, by which it can be distinguished from *D. scolopendrioides*. It resembles that species in its mode of growth, scales and stellate pubescence, but it differs by 1) thinner texture and generally not verrucose under-surface, 2) venation, 3) inframedial sori and 4) by the lamina being fully pinnate below with several pairs of free pinnæ, which diminish gradually downwards. Real intermediates between the two species I have not found. The veins are, as a rule, forked or, in the larger form, pinnate in the lobes, always forming a row of very narrow areoles on both sides of the midrib of the lamina and generally also anastomosing in the segments with a single row of meshes along the main-veins or costa (fig. 28 b). The sori are always inframedial, in the smaller forms in a single row, in the larger ones bi- or pluri-serial, furnished with a small stellato-pilose indusium. According to JENMAN the barren fronds are viviparous near the apex. I have seen some fronds from Porto Rico, which are fertile and viviparous at the apex.

To this species I refer a long row of forms, which JENMAN referred to three varieties; these are however connected with so numerous intermediates, that I dare not consider them good varieties, although there is a great difference in habit between the small form figured by PLUKENET tab. 290 fig. 1 (= Pol. *scolopendrioides* L. ed. II and Sw.) and the large plants described as *Goniopteris affinis* Fée, var. *portoricensis* Kuhn and var. *littorale* Jenm. In the former the leaves are numerous on very short stems, the fertile ones scarcely more than 20 cm long, 2—2 $\frac{1}{2}$ cm broad,

at the middle incised a little more than halfway to the midrib with entire, obtuse lobes; the veins once forked and the sori uniserial. This is the common form in Jamaica. In San Domingo the form described as *Pol. domingense* Spr. is apparently very common. Its leaves are longer (30 cm or more) but scarcely broader than in the Jamaican form and on longer stems but otherwise not materially different. In Porto Rico and Guadeloupe the most common forms are the large var. *portoricensis* Kuhn (Porto Rico) and the true *P. guadalupense* Wikstr. (syn. *Goniopteris affinis* Fée) (Guadeloupe). The leaves of these forms are up to 50 cm long on long stems, often more than 10 cm broad at the middle, incised almost to the midrib in broadly linear segments, which are 4—5 cm long, 1 cm broad and often again deeply lobed. Veins pinnate in the lobes and sori in several rows or even in a distinct row on each side of the secondary veins. The middle segments are often considerably and unequally lengthened.

Specimens examined:

- Guadeloupe, FORSSTRÖM (S); L'HERMINIER nr. 128 (B, C = *G. affinis* Fée) — PÈRE DUSS nr. 4059 (CC, H, RB, W), 4389 (C).
 Martinique: LENORMAND (B).
 Porto Rio: SINTENIS nr. 877, 2450, 5452, 5664, 5820, 5840, 5841, 5949, 6108, 6234, 6247 (B and partly C, CC, S, W) — G. P. GOLL nr. 271, 870, 881, 948, 1015 (W) — A. A. HELLER nr. 6174 (W) — Mr. and Mrs. HELLER nr. 354 (W) — UNDERWOOD and GRIGGS nr. 52, 76, 883 (W).
 San Domingo: BERTERO (B = *Pol. domingense* Spr.), BALBIS (B) — WEINLAND nr. 44 (B) — PICARDA nr. 155, 209, 387, all from Haïti (B) — inter Batey et Jamao, EGGERS nr. 2605 (B) — in flumine Mameges, EGGERS nr. 2657 (B) — in monte Isabel de la torre, EGGERS nr. 2733 (B, RB) — La Cumbra, RAUNKJÆR nr. 102 (CC, H) — v. TUERCKHEIM nr. 2517, 2644, 2845 (B).
 Jamaica: P. BROWNE (S, ex herb. Linn.) — SWARTZ (S) — Blue Hole, Å. FREDHOLM nr. 3192 (W) — near Port Antonio, MAXON nr. 1985, UNDERWOOD nr. 2989, 1703 (W) — near Priestman's river, MAXON nr. 2495 (Rg, W) — Mt. Diabolo, 750 m., MAXON nr. 2259 (W) — WILSON nr. 43 (B) — J. DAY nr. 68 (B).
 Cuba: E. OTTO nr. 38 (B), LENORMAND (B), RUGEL (B) — San Antonio de los Baños, Prov. Habana, v. HERMANN nr. 3357 (W).

The plant described as *Goniopteris gracilis* Moore et Houlst. Gard. Chron. 1856: 301, fig., of which I have seen authentic specimens (B), can, I think, safely be regarded as a form of *D. guadalupensis*, while several other forms, cultivated under the name *G. gracilis*, are to refer to *D. reptans*. The true *G. gracilis* is a form with many free pinnæ and with a proliferous bud in the upper part of the midrib.

212. *Dryopteris Peripae* (Sod.) C. Chr. Index 284. 1905. — Fig. 28 d.

Syn. *Nephrodium Peripae* Sodiro, Rec. 52. 1883; Cr. vasc. quit. 265. 1893.

Type from Ecuador, secus flum. Peripa, leg. SODIRO (Kew!)

A distinct species, perhaps nearest related to *D. Levyi* and *D. guadalupensis*; it resembles also *D. hastata* in its long pinnatifid apex, which is not much shorter than the lower pinnate portion of the lamina, but otherwise it is very different. — The short creeping or decumbent rhizome bears some few stellato-pubescent scales.

Stipes fasciculated, up to 25 cm long, glabrous. Lamina papyraceous, narrow-lanceolate, 30–40 cm long, 4–10 cm broad, pinnate about to the middle, upwards gradually tapering into a long pinnatifid apex. Lowest pinnae considerably shortened, larger ones sessile and the upper adnate to rachis, distant, opposite, 3–5 cm long, $1\frac{1}{2}$ cm broad, obtuse, shallowly serrulate. Rachis, costae and veins beneath rather densely setulose by long, rigid hairs and with fewer short, stellate hairs; leaf-tissue of upper-surface minutely pubescent by adpressed hairs of under-surface glabrous, not verrucose. Veins prominent beneath, 3–4 to a side, those of the basal pair much upcurved and generally united before reaching sinus. Sori inframedial, mostly confined to the anterior basal vein. Indusium subsistent, setose by simple hairs. Sporangia glabrous; receptacle setose.

213. *Dryopteris dissimulans* Maxon et C. Chr. n. sp.

= *D. scolopendrioides* (L.) O. K. × *D. sagittata* (Sw.) C. Chr.?

Type from Cuba: Arroyo de Pedro, ad Jaguey, 600 m., EGGERS nr. 4958 (W!)

Rhizomate erecto, dense radiculoso, squamis brunneis sparse stellato ciliatis onusto. Stipitibus fasciculatis, 3–5 cm longis, strictis, minute stellato-pulverulentis et sparse squamosis. Lamina ad 30 cm longa, supra medium 4 cm lata, versus apicem breviter acuminata, versus basin longe et gradatum attenuata, coriacea, griseo-viridi, ad medium pinnata, supra medium fere ad rachin pinnatifida. Rachi tereti, stellato-puberula. Pinnis liberis multijugis sensim reductis, inferioribus 2–3 mm longis et latis, omnibus basi utrinque subauriculatis, adnatis; segmentis supra-medialibus ad $2\frac{1}{2}$ cm longis, a basi, 6 mm lata, versus apicem acutum sensim attenuatis, parum obliquis, sinubus acutis separatis, supra glabris, infra praesertim ad costas venasque breviter stellato-puberula. Venis bi-trifurcatis, ramis versus marginem non raro anastomosantibus. Soris parvis, in segmento biserialibus, fere medialibus. Indusiis parvis, stellato-ciliatis. Sporangii glabris.

In general I am not inclined to consider a form intermediate between two known species a hybrid between them, but in this case I am not far from believing that the present plant is a hybrid between *D. scolopendrioides* and *D. sagittata*. In almost every respect it is exactly intermediate between the two species. In the presence of an indusium and in cutting it resembles the former species, in the shape of the segments and in the large number of downwards gradually dwindling pinnae, which show a tendency to becoming auricled on both sides at base, it is very like the latter. In venation it is also intermediate. Hereto comes the fact that the sporangia are partly abortive and do not produce spores, and further that EGGERS has gathered both true *D. sagittata* (nr. 4950) and *D. scolopendrioides* (nr. 4887) in the same locality. From *D. guadalupensis* (Wikstr.) *D. dissimulans* differs by coriaceous texture, grey-green colour, somewhat verrucose under-surface, by the large number of free and closely placed pinnae and by the basal veins rarely being goniopteroid.

214. *Dryopteris cordata* (Fée) Urban, Symb. Antill. 4: 18. 1903; C. Chr. Ind. 258.

Syn. *Phegopteris cordata* Fée, Gen. 244. 1850—52; 6. mém. 13 tab. 6 fig. 3.

Aspidium reptans var. 1. *cordata* Mett. Aspid. nr. 237. 1858.

Polypodium cubanum Bak. Syn. 304. 1867.

Type from Cuba, leg. LINDEN nr. 1873 (not seen).

Rhizome erect, with a few stellato-ciliate scales. Leaves fasciculated; stipe 3—5 cm long, like rachis slightly stellato-puberulous and with some few longer, simple hairs. Lamina up to 30 cm long, 3 cm broad, linear, pinnate from base to short of the apex; larger leaves sometimes terminating in a scaly bud, which produces a rosette of young leaves, grey-green, chartaceous, opaque. Pinnæ numerous (20—30 to a side), close horizontal, distinctly stalked, oblong, $\frac{1}{2}$ — $1\frac{1}{2}$ cm long, $\frac{1}{2}$ cm broad, their base cordate, the apex bluntly rounded, the lower ones often gradually shortened, both surfaces, especially on veins, with not many small stellate hairs. Veins about 8 to each side, generally forked, free. Sori a little above the middle of the vein in a single row on each side of the midrib, exindusiate, but the receptacle with several branched hairs. Sporangia with some bi-trifurcate, deciduous setæ, soon glabrous.

The typical form from Cuba of this species is widely different from most forms of *D. reptans*, with which METTENIUS united it. In Porto Rico a form was collected by SINTENIS (nr. 6380, 6588) referred hereto by URBAN, which resembles *D. cordata* in shape of the pinnæ; still I am inclined to regard the specimens as young states of *D. reptans*. The pinnæ are shorter, more ovate, scarcely cordate at base, and the sori are distinctly exindusiate.

Cuba: El Yunque, Mt. Baracoa, UNDERWOOD and EARLE nr. 725 (W) — Monte Verde, WRIGHT nr. 1014 (B, S) — Josephina, Yateras, Oriente, MAXON nr. 4117 (W).

Related forms, but doubtfully belonging here:

Bahama Isl.: Andros, JOHN J. and ALICE R. NORTHROP nr. 576 (B), ? 583 (B).

San Domingo: ad flum. Mameges, EGGERS nr. 2656 (B).

215. *Dryopteris sagittata* (Sw.) C. Chr. Ind. 290. 1905.

Syn. *Polypodium sagittatum* Sw. Prod. 132. 1788.

Polypodium hastaefolium Sw. Schrad. Journ. 1800²: 25. 1801; Hk. et Grev.

Ic. Fil. tab. 203; Bak. Syn. 304; Jenman, Bull. Dept. Jam. n. s. 4: 127.

Polypodium hastatum Sw. Fl. Ind. occ. 1653. 1806.

Aspidium reptans var. 2. *hastaefolia* Mett. Aspid. nr. 237. 1858.

Aspidium hastifolium Gris. Fl. br. W. Ind. 694. 1864.

Type from Jamaica, leg. SWARTZ (S!).

A distinct species, not closely related to *D. reptans*, with which METTENIUS united it; the plate cited above gives a fair illustration of it. Most pinnæ short stalked and bearing a pair of acute spreading auricles at base, entire or faintly crenulate, the lower ones gradually reduced to mere auricles. Rachis and costæ

beneath rather densely pulverulent by very short-branched stellate hairs, surfaces otherwise glabrous. Leaf greyish-green, chartaceous. Veins simple or forked or subpinnate. Sori apparently exindusiate, about medial. Sporangia glabrous.

Jamaica: MAXON nr. 1176, 1828, 1930 (C), 2544 (W).

Cuba: Arroyo de Pedro, EGGERS nr. 4950 (B, C) — Monte Verde, WRIGHT nr. 812 (S).

var. **tenebrica** (Jenman).

Syn. *Nephrodium tenebricum* Jenm. Journ. Bot. 1882: 326; Bull. Dept. Jam. n. s. 3: 143. 1896; W. Ind. and Guiana Ferns 228.

Dryopteris tenebrica C. Chr. Ind. 297. 1905.

A much larger plant than the type but scarcely different by other characters than the size. "Plant shuttle-cock-like in habit with sometimes as many as 45 developed fronds to one rootstock" (HARRIS in sched.). Stipe 10—12 cm, lamina up to 30 cm long by 8 cm broad. Pinnæ 4—5 cm long, $\frac{3}{4}$ —1 cm broad, serrulate or shallowly lobed. Veins pinnate in the lobes, 2—4 jugate, the basal pair anastomosing and sending a branch to the sinus. JENMAN describes the sori as indusiate, the indusium being minute, soon obliterated.

Jamaica: SHERRING (type, Kew!) — Holly Mount, Mt. Diabolo, HARRIS nr. 8998 (B).

San Domingo: prope Jérémie, WEINLAND nr. 55 (B).

216. *Dryopteris reptans* (Gmel.) C. Chr. Ind. 288. 1905.

Syn. *Polypodium repens* Sw. Prod. 132. 1788 (not 130).

Polypodium reptans Gmel. Syst. Nat. 2²: 1309. 1791; Sw. Fl. Ind. occ. 1655; Bak. Syn. 316.

Aspidium reptans var. 3 *radicans* Mett. Aspid. nr. 237.

Nephrodium asplenioides part. and subsp. *reptans* Jenman, Bull. Bot. Dept. Jam. n. s. 3: 212. 1896; W. Ind. and Guiana Ferns 229.

Dryopteris radicans Maxon, Contr. U. S. Nat. Herb. 10: 490. 1908.

Polypodium repandum Sw. Schrad. Journ. 1800²: 25. 1801; Fl. Ind. occ. 1654; (C. Chr. Arkiv för Bot. 9¹¹: 31 fig. 7, tab. 4 fig. 2. 1910; illustrations of SWARTZ's type-specimens).

Type from Jamaica, leg. SWARTZ (S!).

When excluding the subsp. *sclerophyllum*, which is our *D. asplenioides*, JENMAN's treatment of this extraordinarily variable species under the name *Nephrodium asplenioides* is very good, when the Jamaican forms only are concerned. Other forms occur in Cuba and Central-America, but I have failed to find good characters by which these forms may be distinguished from the typical form described by SWARTZ. I can, however, not agree with METTENIUS in considering *D. cordata*, *D. sagittata* and *D. asplenioides* forms of the same species: they are all in this paper dealt with as good species; also *D. asterothrix*, in my Index referred to *D. reptans* as a subspecies, appears to be a good species. Separating out these four forms as

distinct species there remains a good number of forms, which I refer to a single species, *D. reptans*. Although very different in habit and size they show some common characters: 1) the long radican apex of some leaves, 2) the pubescence of the surfaces, especially the upper one, by forked hairs, 3) the glabrous sporangia; the head of the sporangia appears always to be glabrous, but the pedicel often bears a single hair; the receptacle is as a rule setose by long hairs, which often are longer than the sporangia, 4) the presence of a small indusium consisting of a few cells bearing long simple or forked hairs. — In developed fronds the lower pair of veins, which spring out from the secondary vein 1—2 mm above its base, are goniopteroid and send a branch to the sinus; in young leaves the veins are sometimes all free. The rhizome is erect, clothed at the top with proportionally few glossy, brown, stellato-pubescent scales. Stipites fasciculated, slender, stramineous. Lamina generally herbaceous but frequently chartaceous or even coriaceous, more or less hairy on rachis and ribs by long, simple hairs. Most pinnæ short-stalked, the lower ones not or slightly reduced, the margins cut into shallow rounded lobes or subentire. Veins 2—5 to a side, not very prominent beneath. Sori below the middle of the vein. As to size and shape of leaves and pinnæ nothing can be said, which agrees even with two specimens from the same locality. It seems that leaves from same rhizome but of different age vary very much.

MAXON has recently tried to show that the right name of this species is *D. radicans* (L.). It is illustrated by SLOANE pl. 29 and 30 fig. 1 and by PLUKENET pl. 253 fig. 4, which plates were cited by LINNÆUS under his first description of *Asplenium radicans* (Syst. Nat. ed. X. 2: 1323. 1759), as well as by SWARTZ under his *P. reptans*. If LINNÆUS really founded his *Asplenium radicans* (= *Aspl. radicans* of my Index) on SLOANE'S plate, MAXON is certainly right in changing the name, but we have here a case, which exactly corresponds with that of *Asplenium erosum* L., which name MAXON uses for the well-known *A. auritum* Sw. This latter case I have dealt with in some detail in my paper on SWARTZ'S species of ferns (Arkiv för Bot. 9¹¹: 14—17). It is right that LINNÆUS under the first description of his *Aspl. radicans* quoted the said plates only; but in Spec. plant. ed. II. 1540. 1763, where the name is changed to *Aspl. rhizophyllum*, he immediately after the description cites "BROWN. Jam. 92". This additional citation is important, because it proves that LINNÆUS founded his species on dried specimens, not on SLOANE'S plates. LINNÆUS bought namely, in the year 1758 a collection of Jamaican plants gathered by P. BROWNE, and described in BROWNE'S work on Jamaica. This work from 1758 LINNÆUS did not know during the preparation of the tenth edition of *Systema Naturæ* and therefore it could not, of course, be cited in this edition. It is natural that LINNÆUS tried to determine BROWNE'S specimens by aid of SLOANE'S and PLUKENET'S works, and when finding a plate, which he believed to illustrate the species, he quoted that plate. Knowing BROWNE'S work while preparing the second edition of *Species plantarum* he then always cited this work before the citations given in 1759 and always immediately after the description, which proves

that his new species was founded on a specimen from BROWNE, not on the plates quoted. Subsequently *Aspl. radicans* L. (= *A. rhizophyllum* L.) is not the same as *P. reptans* Sw., and the right name of our species must be *D. reptans* (Gmel.).

D. reptans is a common species in Jamaica and Cuba and occurs also but more rarely in some other islands, Florida and Central America. The smallest form occurs in the eastern islands, the largest in Cuba and Florida. I shall here mention some of the more characteristic forms.

1. var. **tenera** (Fée).

Syn. *Goniopteris tenera* Fée, 11 mém. 60 tab. 15 fig. 3. 1866.

A small, thin-leaved form; leaves apparently never radicant. Stipe very slender, shorter than the lamina, this 6–12 cm long, 5 cm broad at the base; pinnæ short-stalked, close, the lower ones reduced or not, about $2\frac{1}{2}$ cm long by 1 cm broad, obtuse at the point, rather deeply lobed, broadest at the truncate base. Veins about 3 to each side. — Differs from the next variety by its not radicant leaves and uniform fronds, from *D. asplenioides* by its thin texture, not prominent veins and especially by the leaf tissue of both surfaces being rather densely but minutely pubescent by stellate hairs.

JENMAN'S var. *tenera* is probably not the same; I have seen no Jamaican specimens, which exactly corresponds with FÉE'S type, although single leaves from rhizomes, which also bear radicant or differently shaped leaves, are very slightly different.

Guadeloupe: L'HERMINIER (type; Herb. COSSON Paris!; B).

Porto Rico: SINTENIS nr. 1770 (B, C, W).

2. var. **eu-reptans** Jenman, loc. cit.

Hereto a good many forms which I have tried in vain to distinguish from each other. Not only are two identical specimens not to be found but the leaves from the same rhizome also are often very different. Very often the sterile and fertile leaves are different, the former being very short-stalked, prostrate, rooting or not, the latter much higher on long stalks and often of a much more rigid texture, radicant or not, the pinnæ generally distant; in other specimens also the short, prostrate leaves are fertile. The pinnæ are very differently shaped, even in leaves of the same rhizome; in the short-stalked leaves they resemble those of var. *tenera*, i. e. short-stalked, obtuse at the apex, rather deeply lobed, 2–4 cm long, $\frac{3}{4}$ –1 cm broad, but not so closely placed. The long-stalked, most often fertile and often radicant leaves are more varying, the pinnæ being sessile or stalked, entire or crenate or lobed, often hastate at base, acute or rounded at the apex, etc. A peculiar form is that described as *Pol. repandum* Sw.; here the short-stalked, prostrate, sterile leaves are radicant, while the fertile leaves are very long-stalked (stipe up to 20 cm high), not radicant, pinnæ very distant, scarcely $\frac{1}{2}$ cm broad, 2 cm long, almost coriaceous, the margins revolute, crenate or almost entire; veins

2—3. Probably such leaves develop only in old plants. In quite young plants the pinnæ are sometimes quite entire, ovate or nearly circular, the veins free: such forms have been referred to *D. cordata*. — Some forms are nearly destitute of stellate hairs.

The following specimens are typical, if such a term may be used here.

- Jamaica: MAXON nr. 2104 (C, H, Rg, W), 2102, 2191 (C, W), 2341, 2557 (W), 2943 (CC, Rg, W); CLUTE 334 (W); UNDERWOOD nr. 1784 (W); and others.
 Haïti: Marmelade, NASH and TAYLOR nr. 1232 (W) — Sto. Domingo: Puerto Plata, EGGERS nr. 1577 (C) — PICARDA nr. 228, 358 (B).
 Cuba: Oriente, Farallones de la Perla, MAXON nr. 4407 (W) — Yateras, MAXON nr. 4429 (W) — Prov. Santiago, El Yunque, POLLARD and PALMER nr. 122 (W) — Prov. Habana, San Antonio de los Baños, ABARCA nr. 4531 (W), BAKER nr. 2755 (W) — Prov. Pinar del Rio, near El Guama, PALMER and RILEY nr. 126 pt (W) — E. OTTO nr. 85 (B).
 Bahamas: New Providence, RAWSON W RAWSON (B).
 Venezuela: Caripe, MORITZ nr. 213 (B).

3. var. *angusta* n. var.

Fronds rather uniform, often radican, very short-stalked, linear, often considerably narrowed downwards. Pinnæ distant, small, rarely more than 1½ cm long, often only ½ cm, scarcely ½ cm broad, obtusely rounded at the apex, the margins entire or slightly crenated, rounded or auricled at base; secondary veins once or twice forked, free or united near the edges.

Very characteristic by the long, very narrow, flaccid leaves, which are often rooting as in *eureptans*. It approaches *D. cordata*, from which it differs by its distant pinnæ, thinner texture, long proliferous apex and pubescence.

- Cuba: Oriente, Monte Verde, WRIGHT nr. 813 (B, type!; C, S) — Bejucal, LIEBMANN (H) — Nazarene, BAKER nr. 1899 (B, W).
 Jamaica: WILSON nr. 54 (B).
 Porto Rico: Utuado, SINTENIS nr. 6380 (C), 6588 (CC; pinnæ nearly circular).
 Guatemala: Dept. Alta Verapaz, Cubilquitz, v. TUERCKHEIM ed. DONN. SMITH nr. 8481 (W) — Pansamá, v. TUERCKHEIM, ed. DONN. SMITH nr. 712 b (W) — Coban, v. TUERCKHEIM ed. J. D. S. nr. 712 (W).

4. var. *conformis* n. var.

Differs from var. *eureptans* by its mostly uniform leaves, which have the general habit of the short-stalked mostly sterile leaves of *eureptans*, but the stipites are rather long and the lamina often much larger. Long-stalked, differently shaped leaves are not to be found, but often the radican leaves are somewhat narrower than the non-radican ones. — All leaves long-stalked, stipe often as long as the lamina or even longer. Lamina mostly lanceolate in outline, often 20 cm or more long but as a rule shorter, 5—8 cm broad, shortly narrowed downwards. Pinnæ very short-stalked the lower ones mostly rather shortened, distant, the largest up to 5 cm long, often cut ⅓ or more to the costa and cordate at base. — It is less proliferous than *eureptans*, still one or two radican leaves are to be found in most

specimens. It approaches *D. asterothrix*, from which it differs by its not so densely pubescent fronds, glabrous sporangia and proliferous leaves. From *D. asplenioides* it differs by its obtuse pinnæ, stellate pubescence of the leaf-tissue, scarcely prominent veins and nearly sessile pinnæ; from var. *tenera* by the distant lower pinnæ and proliferous leaves.

Most specimens from Cuba, Central America and Florida belong to this variety, which represents the most developed state of the species; in the largest form it is very different from *eureptans*, but there are numerous intermediate forms between the two varieties.

Florida: Hammock on left bank of Withlacoochee, near Brooksville, cavernous, calcareous rocks, J. DONNELL SMITH (type collection, W) — Dade Co., Castella's hammock, A. A. EATON nr. 262 (W) — Isthacatta, L. M. UNDERWOOD nr. 277 (W) and A. H. CURTISS nr. 5965 (W. approaching var. *eureptans*).

Bahamas: Andros, JOHN J. and ALICE R. NORTHROP (B).

Cuba: Prov. Habana, Rincon, WILSON nr. 205 (B, W); San Antonio de los Baños, A. H. CURTISS nr. 639 (B, H, W) and VAN HERMANN nr. 3360 (W) — Prov. Pinar del Rio, near El Guama, PALMER and RILEY nr. 126 pt., 230 pt., 403 (W), 248 (CC, H, W) — E. OTTO nr. 62 (B).

Mexico: in speluncis près Orizaba, BOURGEOU nr. 2514 (B, H, S, W); base of calcareous cliffs, near Orizaba, PRINGLE nr. 5594 (W) — Yucatan, SCHOTT nr. 779 (W).

217. *Dryopteris asterothrix* (Fée) C. Chr. comb. nov. — Fig. 29.

Syn. *Goniopteris asterothrix* Fée, Gen. 253. 1850—52.

Phegopteris asterothrix Mett. Pheg. nr. 40. 1858.

Dryopteris reptans **asterothrix* C. Chr. Ind. 288. 1905.

Type from Cuba, leg. LINDEN nr. 1917 (f. FÉE, not seen), nr. 1878 (B!).

This seems to me a very distinct species, although some forms of the protean *D. reptans* resembles it very much. The accompanying figure will give an idea of its habit. The oblique or short-creeping rhizome, which bears some few stellato-pilose scales, bears a small number of leaves, which are of a very thin texture and throughout clothed with small stellate hairs. The stipe is slender, stramineous and like the rachis densely soft-hairy by patent, whitish hairs under which numerous small stellate hairs are to be found. Lamina 15 cm × 5—6 cm, bipinnatifid, the apex obtuse. Pinnæ opposite or subopposite, 6—10 on each side of rachis, the lower ones short-stalked, the upper ones sessile, at least confluent, 2¹/₂—3 cm long, 1—1¹/₄ cm broad, obtusely rounded at the apex, slightly broader at the base, the lowest pair generally a little shorter and deflexed; and below them a pair of small, reduced pinnæ are often seen; both surfaces densely and shortly stellato-pilose and costæ and veins besides with long, soft, patent hairs. Lobes or segments broad, obtuse, the middle one often a little lengthened. Veins rather indistinct, about 4 to each side of the midrib of the lobe, the lower pair united. Sori small, exindusiate, medial or a little inframedial; receptacle with numerous, long-stalked branched hairs; sporangia very loose, at the bearing 2—3 erect 2—3 branched hairs, which are very deciduous, and therefore the sporangia may be found to be glabrous.

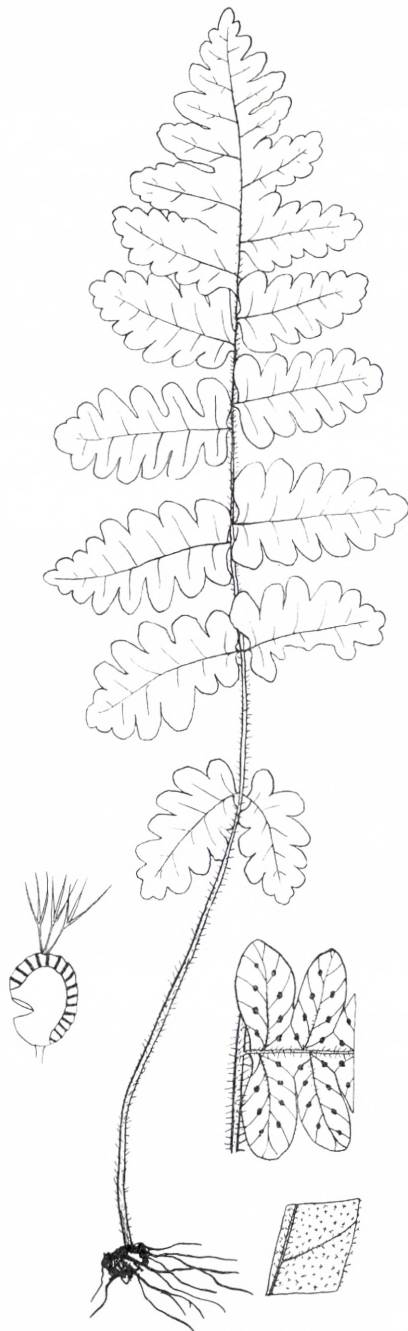


Fig. 29. *D. asterothrix* (Fée) C. Chr. Entire leaf $\times \frac{4}{5}$; base of pinna $\times 1\frac{1}{2}$; fragment $\times 4$; sporangium. (LINDEN 1878).

From *D. reptans* *D. asterothrix* can be distinguished by its size, never rooting apex, its soft-hairy rachis and stipe, setose sporangia and its whole habit. The rhizome bears often under the long-stalked fertile leaves a rosette of small sterile ones. — The following specimens are very uniform; several of them from various herbaria were determined by *Dr. Christ* as *A. dissidens* Mett., under which name the Guatemalan specimens were distributed by DONNELL SMITH.

Cuba: Prov. Oriente, caverns of Thermopylae, Monte Libano, 600 m, MAXON nr. 4240 (W)

Jamaica: Mt. Diabolo, UNDERWOOD, nr. 1798 (W) — near Bath, MAXON nr. 1869 (W).

Guatemala: Dept. Alta Verapaz, Xuiepec, Cubilquitz, v. TUECKHEIM ed. J. D. S. nr. 8355 (B, W).

Costa Rica: WERCKLÉ (C, W).

Venezuela: Tovar, FENDLER nr. 201 (B).

var. **bibrachiata** (Jenman).

Syn. *Nephrodium bibrachiatum* Jenman, Gard. Chr. III 15: 230. 1894; W. Ind. and Guiana Ferns 228.

Dryopteris bibrachiata C. Chr. Ind. 254. 1905.

Not essentially different from the type, but the basal pinnae the largest (small, reduced pinnae always absent), on longer petioles (2 mm long), stipe and rachis with fewer or no long soft hairs. JENMAN describes the indusium as distinct; I have failed to find it.

Jamaica: JENMAN (W; type) — John Crow Peak, 5500–6000 ft; MAXON nr. 1317 (= UNDERWOOD nr. 2443) (W) — Mt. Diabolo, MAXON nr. 1940 (W; Rg).

218. ***Dryopteris sclerophylla*** (Kze) C. Chr.

Biol. Arbejder tilegn. Eug. Warming 84. 1911.

Syn. *Aspidium sclerophyllum* Kze in Spr. Syst. 4: 99, 1827; Linn. 9: 92. 1834.

Aspidium scolopendrioides var. 3: *pinnata* Mett. Aspid. nr. 235. 1858.

Aspidium dissidens Mett. Aspid. nr. 275b. 1858; C. Chr. Ind. 71.

Nephrodium dissidens Hk. sp. 4: 66. 1862. Hk. Bak. Syn. 295.

Dryopteris dissidens O. Ktze. Rev. 2: 812. 1891; Urban, Symb. Ant. 4: 19. 1903.

Nephrodium jamaicense Bak.; Jenm. Journ. Bot. 1877: 264. Bull. Dept. Jam. n. s. 3: 163. 1896.

Dryopteris jamaicensis C. Chr. Index 272. 1905.

Nephrodium asplenioides Bak. Syn. 293 (part?).

Aspidium Sintenisii Kuhn et Christ.; Krug, Engl. Jahrb. 24: 119. 1897.

Dryopteris Sintenisii Urban, Symb. Ant. 4: 19. 1903; C. Chr. Ind. 293.

Type from Cuba leg. POEPPIG (specim. auth. vidi in Herb. Berol. et Herb. PRESL).

A distinct but very misunderstood species, by METTENIUS considered the most developed form of his *A. scolopendrioides*, while Baker (Syn. Fil. 293) very improperly referred it to his *Nephrodium asplenioides*. As the above list of synonyms shows, the species has been described under at least three new names, of which *A. dissidens* was placed in Syn. Fil. under the subgenus *Pleocnemia* (!). It is beyond question that the forms referred by me to *D. sclerophylla* are closely related when not absolutely identical. The main-characters of the species are 1) the coriaceous or papyraceous texture of the lamina, which is of a characteristic grey colour due to the dense pubescence of stellate hairs throughout both surfaces, 2) the thick, undulato-crenate margins of the teeth or lobes, which generally seem to be acute or even mucronate because the margins of the lobes are revolute, 3) the prominent veins, 4) the supramedial or even submarginal sori, and 5) the glabrous sporangia.

The erect or oblique rhizome is at the top densely clothed with red-brown or nearly black, glossy, stellato-pilose scales. The lamina varies in size and degree of cutting but it is always fully pinnate from base to the middle. The basal pair of veins is always truly anastomosing. Sori with a distinct, stellato-pubescent indusium. I can distinguish two forms.

1. (typical *sclerophylla*). Leaves on short stems, long and gradually narrowed below. Pinnæ short (3 cm \times $\frac{3}{4}$ cm) the lower ones gradually smaller almost as in *D. opposita*, the fully developed ones sessile with a subcordate base, the upper ones confluent all broadly serrate, scarcely pinnatifid. Veins simple; sori medial. Scales of rhizome few, brown.

Cuba: POEPPIG (B, hb. PRESL) — Prov. Habana, BAKER and O'DONAVAN nr. 4135 (W); BAKER nr. 1888 (W) — Prov. Pinar del Rio, PALMER and RILEY nr. 230, 227, 391, 533 (W); BAKER nr. 3797 (W) — v. HERMANN nr. 2185, 3256 (W) — Prov. Oriente, WRIGHT nr. 1005 (B, S), 3923 (B, W, S) MAXON nr. 4447 (W) — Prov. Santiago, POLLARD and E. and W. PALMER nr. 41 (W).

2. Leaves on longer stems, ovate or elliptic, shortly narrowed downwards. Pinnæ short-stalked or sessile with cordate base, up to 8 cm long, $1\frac{3}{4}$ —2 cm broad, pinnatifid to a narrow wing to the costa. Veins pinnate in the lobes, often furcate and forming costular areoles, very prominent beneath. Sori supramedial or submarginal. Scales of rhizome nearly black, 2 cm long, glossy.

Cuba: Prov. Habana, WILSON nr. 671 (W), CURTISS nr. 592 (H, W), — Prov. Pinar del Rio, PALMER and RILEY nr. 126, 223, 567 (W) — Prov. Oriente, WRIGHT nr. 1001 pt. (S, W), MAXON nr. 4389, 4422 (W), EGGERS nr. 4941 (B).

This form looks very different from the type, but it can not be distinguished even as variety; in some specimens are to be found young leaves, which are fully identical with the typical form. With this large form agree the Porto Rico and Jamaican original specimens of *A. dissidens* Mett. (Syn. *A. Sintenisii* Kuhn) and *N. jamaicense* Bak. The latter differs from the Cuban form only by its lighter scales of the rhizome, more distinctly stalked pinnæ, which are often unequal, at the base, and by less stellato-pilose leaf-tissue and somewhat sided thinner texture. *A. dissidens* is almost quite identical with *jamaicense*. I have not seen the original specimen of it, which was collected in Porto Rico by BALBIS, but a sketch of it is found in Herb. Berol, which is from the hand of METTENIUS and perfectly agrees with the original diagnosis. It is absolutely identical with *A. Sintenisii* from the same island. In this form the veins frequently are united in the lobes, so that they form costular areoles; BAKER, therefore, placed it in the subgenus *Pleocnemia*. The sori are perhaps closer to the margin than in the other forms of the species.

Jamaica: JENMAN (B) — HART nr. 347 (W).

Porto Rico: SINTENIS nr. 2136 (B, C, CC, S, W).

219. *Dryopteris asplenioides* (Sw.) O. Ktze. Rev. 2: 812, 1891;

C. Chr. Ind. 253 (part.). — Fig. 28 e.

Syn. *Polypodium asplenioides* Sw. Schrad. Journ. 1800²: 26. 1801; Fl. Ind. occ. 1659.

Aspidium reptans var. 4. *asplenioides* Mett. Aspid. nr. 237. 1858.

Nephrodium asplenioides (Bak. Syn. 293?) part. and 1. sub-sp. *sclerophyllum* Jenman, Bull. Bot. Depart. Jamaica n. s. 3: 211. 1896; W. Ind. and Guiana Ferns 230.

Woodsia pubescens Spr. Nova Acta 10: 233 tab. 16 fig. 5—7 1821!

Type from Jamaica, leg. SWARTZ (S),

I think that this species is distinct from *D. reptans*, although it is difficult to give good characters by which it can be distinguished from not-rooting forms of that species. The main characters are: Leaf pinnate to short of the never rooting apex, often long tapering almost from the base, 3—5 dm long, chartaceous or firmly membranous, fresh-green, often glossy, rachis more or less pubescent by as well long, simple hairs as minute stellate ones. Pinnæ very numerous; often 25 to a side, most of them distinctly stalked, often characteristically falcate, the base generally cordate, the point obtuse or acute, 4—6 cm long, $\frac{3}{4}$ — $1\frac{1}{2}$ cm broad, the margins subentire, crenate, or, often more or less lobed into rounded, somewhat oblique lobes, often auricled on both sides of the base, ciliate, upperside glabrous, costæ and veins beneath hairy by long, simple hairs and small, stellate hairs, leaf-tissue glabrous. Lower pinnæ not or only slightly reduced. Veins simple, 3—4 jugate, prominent beneath, the basal pair always anastomosing. Sori near the midvein of the lobe, furnished with a small indusium, which is ciliated by simple

or forked hairs. Head of sporangium glabrous, but its pedicel bears a single simple or furcate hair. — None of the specimens referred hereto shows small short-stalked sterile leaves, which are often to be seen in specimens of *D. reptans*; all leaves from the same rhizome are always uniform, the stipes are stramineous, glabrous. 8—15 cm long, slightly scaly below, fasciculated on an erect rhizome, which is rather scaly at the top by glossy, brown, acuminate, stellato-pubescent scales. Larger specimens may be confounded with *D. serrulata*, but I think, that it always can be distinguished from that species by its more decidedly pubescent rachis and costæ and its rounded lobes. From *D. sclerophylla* it differs by its fresh-or-dark-green colour, thinner texture and non stellato-pilose surfaces.

MAXON, believing that *P. asplenioides* Sw. was founded on SLOANE's plate 43 fig. 2, quoted by SWARTZ, reduced SWARTZ's name to a synonym of *D. serrulata*. Granting that SLOANE's plate illustrates our *D. serrulata* rather than *D. asplenioides* I must say again that SWARTZ never founded a species on old figures; his *P. asplenioides* is founded on specimens collected by himself in Jamaica. A specimen from Herb. Sw. (S), which belongs to the present species, agrees very well with SWARTZ's description in Fl. Ind. occ. 1659, but unfortunately it is not labelled with certainty by SWARTZ.

D. asplenioides varies especially in size and texture, which probably is due to age and outer conditions. It is in its true form apparently confined to Jamaica.

Jamaica: MAXON nr. 875, 1406 (= UNDERWOOD nr. 2531), 1507, 1894, 2209, 2258, 2270, 2338, 2866 (W); UNDERWOOD nr. 1800, 320, 2978, 3106 (W); CLUTE nr. 120; HARRIS nr. 7342, 7592 (B); HART nr. 171a, 211 (W).

Haïti: Port au Prince, PICARDA nr. 734 (B) (doubtful).

Cuba: WRIGHT nr. 1801 (S, W).

220. *Dryopteris bermudiana* (Bak.) Gilb. Bull. Torr. Cl. 25: 600. 1898;
C. Chr. Ind. 254.

Syn. *Nephrodium bermudianum* Baker apud Hemsley, Chall. Exp. Bot. 1¹:
86 tab. 13. 1885.

Type from Bermuda (not seen).

Closely related to *D. asplenioides* and the smaller forms difficult to distinguish from that species. Still the pinnæ are generally larger (8—10 × 2 cm) and cut more than halfway to the costa. Both surfaces with scattered, whitish, simple or forked hairs, most numerous on the ribs; rachis rather hairy by short stellate hairs and longer, simple ones. Veins 6—7-jugate, the lower pair united or more often running side by side to the sinus, the others very often furcate. Sori medial or suprmedial, furnished with a ciliate indusium; hairs of indusium simple, or, rarely forked. Sporangia without hair on the pedicel. The scales of the oblique rhizome are stellato-pilose throughout; they are not so large as shown in the plate quoted, which otherwise illustrate the species very well.

Endemic in Bermuda Islands, GILBERT (W), G. B. Goode (W); W. G. FARLOW (S) - REIN nr. 90 (B).

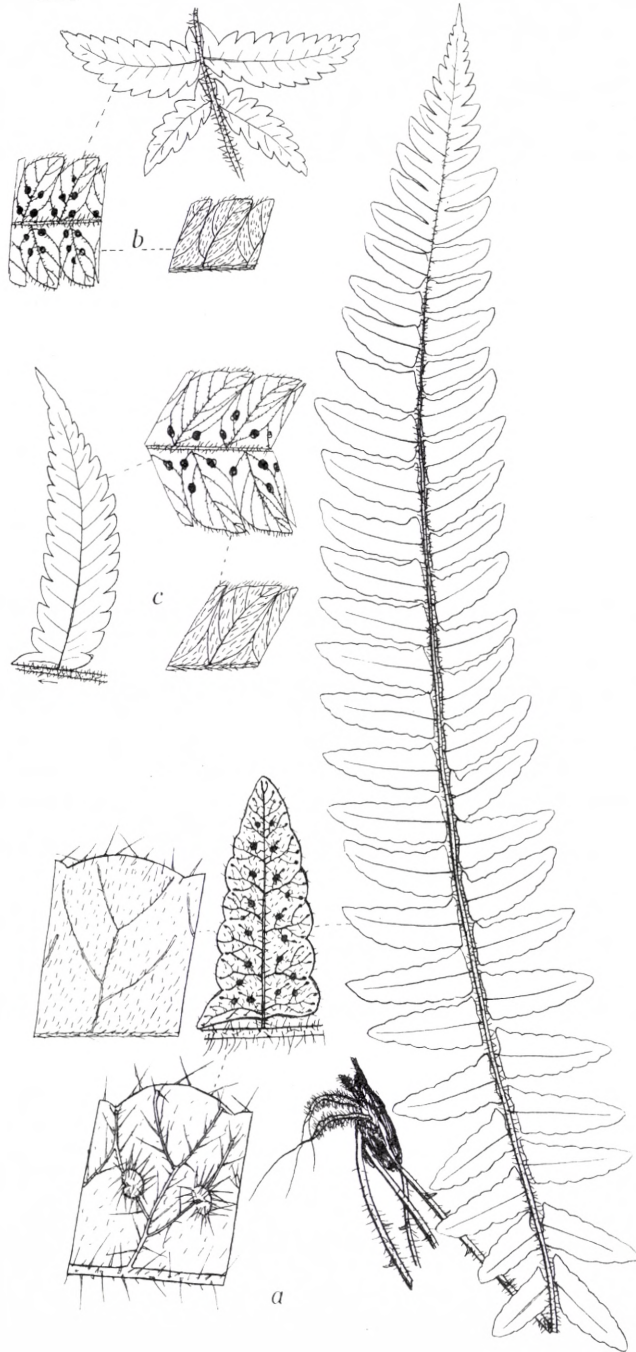


Fig. 30. *a.* *D. semihastata* (Kze.) O. Ktze., l. POEPPIG. Leaf $\times \frac{4}{5}$; pinna $\times 1\frac{1}{2}$; fragment from above with free veins and fragment from the underside with anastomosing veins, $\times 5$. — *b.* *D. Jamesoni* (Hk.) C. Chr. Two lower pairs of pinna, $\times \frac{4}{5}$, segments from both surfaces $\times 1\frac{1}{2}$ (orig.). — *c.* *D. Warmingii* n. sp. pinna $\times \frac{4}{5}$ and segment from both surfaces, $\times 1\frac{1}{2}$.

221. *Dryopteris semihastata*
(Kze.) O. Ktze. Rev. 2: 291. 1891;
C. Chr. Ind. 291. — Fig. 30 a.

Syn. *Aspidium semihastatum*
Kze. Linnaea 9: 91.
1834; Mett. Aspid.
nr. 179.

Lastrea Poepigiana Presl,
Epim. bot. 40, 1849.

Type from Peru, ad flum.
Pampayaco, leg. POEPPIG. A figure of the type-specimen (by METTENIUS) is to be found in (B), and with it agrees perfectly the type-specimens of *L. Poepigiana* Pr. (hb. PRESL!), which also was collected by POEPPIG "in Cuba"; there is no doubt that PRESL's specimen is of the type-collection, and the locality erroneous; POEPPIG collected in 1829 both in Peru and in Cuba.

D. semihastata resembles much a small form of *D. macrotis*, and together with that species its position within the genus is doubtful. It lacks, namely, stellate hairs, and it is possible that the two species are less cut members of the group of *D. patens*; still in general aspect they resemble other species of the present group in which I place them. The accompanying figure will give an idea of *D. semihastata*; in pubescence, auricled, subentire pinnæ, of which the lower ones are reflexed, and also in venation it agrees with *D. macrotis*, but it is much smaller and with only 2—3 pairs of veins, and the auricles are much shorter.

222. *Dryopteris Jamesoni* (Hook.) C. Chr. comb. nov. — Fig 30 b.

Syn. *Nephrodium Jamesoni* Hook. spec. 4: 66. 1862.

Type from Ecuador, ad ripam fl. Napo, JAMESON nr. 761 (Kew!) a very similar plant was collected in Peru, Tarapoto by SPRUCE nr. 3946 (L).

A small species closely related to *D. semihastata*, which it resembles in size, colour, pubescence and the auricled upper base of the pinnæ, but the lamina is fully pinnate scarcely to the middle, upwards pinnatifid only. Largest leaf seen: stipe 9 cm, lamina 17 cm long, 4 cm broad below the middle. Stipe and rachis rather pilose by long, stiff, simple hairs, between which some very small, stellate hairs can be found. Upper surfacæ densely and adpressedly pubescent, costæ and veins beneath setose by patent setæ. Lowest pair of pinnæ reflexed and considerably reduced. Veins in about 3 pairs in the lobe of the larger pinnæ, the basal ones normally united. Sori inframedial furnished by a setose indusium.

It is possible that *D. Jamesoni* is a small variety of *D. macrotis*, which it resembles closely in pubescence of the surfaces, the auricled pinnæ and other characters. BAKER referred it in Syn. Fil. 293 to *Nephr. molle*, to which it is, of course, not at all related.

223. *Dryopteris Warmingii* n. sp. — Fig. 30 c.

Syn. *Nephrodium molle* var. γ *Jamesoni* Bak. Fl. bras. 1²: 489. 1870.

Type from Brazil: Minas Geraes, Lagoa Santa, leg. WARMING 1864 (H!) and the same from São Paulo, Cajurú, REGNELL nr. III. 1449 b. (Rg, W).

Rhizomate crasso, ad 5 cm alto, 1 cm crasso, squamis brunneis sparse stellato-ciliatis praedito. Stipitibus fasciculatis. ad 20 cm longis, tenuibus, pilis minutis stellatis puberulis vel subglabris, supra sulcatis. Lamina 15—20 cm longa, ovato-oblonga, sursum in apicem pinnatifidum sensim attenuata, membranacea vel firmo-herbacea, atro-viridi. Rachi dense pilosis; pilis simplicibus longioribus pilis minutis stellatis intermixtis. Pinnis suboppositis, sessilibus, basalibus reflexis vix abbreviatis, medialibus horizontalibus apicibus curvatim ascendentibus, 3—5 cm longis, 1—1½ cm latis, basi superiore distincte auriculatis, acuminatis, grosse lobatis, dense ciliatis, supra pilis simplicibus adpressis subdense strigosis, subtus ubique (praesertim ad costas venasque) pilis simplicibus pubescentibus. Lobis contiguis, falcatis, obtusis, basali anteriore duplo majore, subacuto. Venis simplicibus, 5—6-jugis, basalibus aut anastomosantibus aut ad sinum conniventibus. Soris inframedialibus, parvis; indusiis parvis, dense setosis, mox deciduis. Sporangiiis pilis longioribus maxime in pedicellis sedentibus intermixtis.

I am convinced that this new species is specifically distinct from the Andine *D. Jamesoni*, with which BAKER united it. It is true that the two species agree as to almost all characters, still our new species is larger, has a larger number of veins, the basal pinnæ scarcely reduced, and the lamina is generally fully pinnate at the lower two-thirds.

224. *Dryopteris macrotis* (Hook.) O. Ktze. Rev. 2: 813. 1891; C. Chr. Ind. 276.

Syn. *Nephrodium macrotis* Hook. spec. 4: 86 tab. 242 B. 1862.

Type from Peru: Tarapoto. SPRUCE nr. 3979 (auth. specimens in RB and L.).

The most developed form of a small group, which includes also the three preceding species, characterized by the strigose upper surface of the lamina tomentose rachis and the reflexed lower pinnæ which like the upper ones are distinctly auricled at the upper base and setose indusia. *D. macrotis* differs from the three other species by its size; stipe and lamina 30–40 cm each, pinnæ 10–15 cm long by 1½–2 cm broad, the lower 2–3 pairs much reflexed, both surfaces adpressedly strigose, rachis apparently without stellate hairs, in some specimens proliferous like several other species of *Goniopteris*; veins 5–6-jugate, very ascending, free and connivent or not reaching the sinus, the basal ones sometimes truly united. ROSENSTOCK has named the forms with anastomosing veins var. *nephrodioides* in Fedde, Repert. 7: 298. 1909, based on SPRUCE nr. 4658 from Peru Mt. Campaña (RB!); the same character is found in specimens of SPRUCE nr. 3979.

225. *Dryopteris serrulata* (Sw.) C. Chr. Ind. 292. 1905; Maxon, Contr. U. S. Nat. Herb. 10: 491. 1908.

Syn. *Polypodium serrulatum* Sw. Schrad. Journ. 1800²: 25. 1801; Fl. Ind. occ. 1663. (C. Chr. Arkiv för Bot. 9¹¹: 34 fig. 8 et t. 5 fig. 1; photograph of the type-specimen).

Aspidium serrulatum Mett. Aspid. nr. 252. 1858.

Nephrodium serrulatum Jenm. Bull. Dept. Jamaica II. 3: 189. 1896.

? *Polypodium Lunanianum* Hew. Mag. Nat. Hist. II. 2: 460. 1838 (t. JENMAN).

? *Polypodium Smithianum* Hew. l. c. 459 (t. Mett. msc.).

Type from Jamaica, leg. SWARTZ (S!)

A well-marked species, distinguished from related species by its pinnæ being broadly serrate only, not pinnatifid, and its inframedial sori. The pinnæ resemble in cutting those of *D. pyramidata*, from which it differs by its lower pinnæ being reduced, by its sessile or subsessile pinnæ and by its few veins. The whole leaf is practically glabrous, the rachis and costæ beneath alone slightly puberulous by minute stellate hairs. Most pinnæ with truncate base, or the lower ones a little narrowed and often auricled. Lobes generally broader than long, often emarginate. Veins 4–5-jugate, the lower 3–4 curved up to the sinus and the basal pair normally united and sending a branch to the sinus. Sori very often confined to the lower veins (still in some specimens all veins are soriferous), distinctly inframedial, often close to the costa. Indusium small, deciduous, furnished with a few furcate hairs. Sporangia glabrous. — Generally the lower 2–3 pairs of pinnæ are gradually shortened, but this is not the case in all specimens. The species varies considerably in size. The largest specimens measure: stipe 30–40 cm, lamina 8 cm,

pinnae 10—13 cm long by 1¹/₂—2 cm broad. The erect rhizome is at the top clothed with many castaneous, acuminate scales.

MAXON (loc. cit.) says that *P. serrulatum* Sw. was founded upon SLOANE's pl. 43 fig. 1 and that *P. asplenioides* Sw., founded upon SLOANE's pl. 43 fig. 2 is the same species. As I have shown in my paper on SWARTZ's species of ferns, SWARTZ has never founded a species upon figures alone but always described them after specimens. The two named Swartzian species were described after specimens collected by SWARTZ himself in Jamaica and MAXON is, therefore, not right in identifying the two species from an examination of the figures quoted only.

D. serrulata seems to be endemic in Jamaica, where a beautiful series of specimens was collected by MAXON (numbers quoted by MAXON loc. cit.), UNDERWOOD, HART and JENMAN (W).

226. *Dryopteris anoptera* (Kze.) C. Chr. Ind. 252. 1905 (excl. syn.). — Fig 31 d.

Syn. *Aspidium anopterum* Kze.; Kuhn, Linnaea 36: 113. 1869 (excl. syn.).

Nephrodium nitidulum Bak. Fl. bras. 1²: 597. 1870; Syn. Fil. 502. (excl. syn.).

Dryopteris nitidula O. Ktze. Rev. 2: 813. 1391.

Goniopteris hastata Fée, Cr. vasc. Br. 1: 107 tab. 33 fig. 2 (non 11 mém. 1866).

Goniopteris bahiensis Fée, l. c. 2: 61. 1872—73.

Type from Brazil: Bahia, leg. MORICAND (B!, RB); RIEDEL (W).

An imperfectly known species, confounded with *Aspidium catacolum* Kze. and *A. nitidulum* Kze. figured by ETTINGSHAUSEN, which no doubt belong to *D. lugubris*. The type-specimen belongs to a species closely related to *D. serrulata*, while other specimens from the same locality, often determined as *D. anoptera*, seem to me to belong to *D. pyramidata*. In size, texture and cutting *D. anoptera*, as understood here, does not at all differ from *D. serrulata*, but it differs by the presence of very small and few scales on the costæ beneath, by its more numerous veins, 7—8 to a side, the lower ones truly united, and by its sporangia being setose by bi- or trifurcate hairs. — I have no doubt that *Gon. hastata* Fée (*G. bahiensis* Fée) is this, although the plate shows a plant with a distinct terminal pinna.

227. *Dryopteris hastata* (Fée) Urban, Symb. Antill. 4: 21. 1903; C. Chr. Ind. 269.

Syn. *Goniopteris hastata* Fée, 11 mém. 65. tab. 18 fig. 1. 1866.

Type from Guadeloupe, leg. L'HERMINIER (Herb. Cosson, Paris!; B).

Rhizome short-creeping or decumbent, like the lower part of the stipes with some stellato-pilose scales. Stipe and rachis shortly puberulous by forked and simple hairs, sometimes nearly glabrous. Lamina up to 5 dcm long, but generally much shorter, pinnate in the lower half or two-thirds suddenly narrowed into a long, broad, pinnatifid or lobed apex, herbaceous, strigose on the costæ above, slightly puberulous by furcate and simple hairs on costæ and veins beneath,

ciliate, dark-green, often glossy. Pinnæ few, 4—8-jugate, 8—10 cm long (or shorter), 2 cm broad, broadest at the middle, the basal ones not or a little shorter, not reflexed, nearly sessile, the upper ones adnate, at least confluent, the uppermost pair shorter and form like a hastate base of the pinnatifid or lobed apex of the lamina, which is 1—2 dcm long by 3—4 cm broad and often exceeds in length the pinnate lower part of the lamina. Pinnæ broadly serrate or even crenate only, the teeth broader than long, oblique, bluntly rounded or their outer margin straight. Veins about 6 to each side, the lower 2—3 pairs united alternately into a flexuose branch running to the sinus, or sometimes the lower pair is meniscioid; often some of the following do not reach the excurrent branch but end in the leaf-tissue. Sori inframedial, exindusiate. Sporangia furnished with bi- or trifurcate hairs.

In several characters, especially in venation and pubescence, *D. hastata* resembles *D. obliterated*, to which species BAKER (Icon. plant. t. 1669) referred it, but it differs considerably by the shape of the apex of its lamina and by its setose sporangia. By these two characters connected it is also different from allied species with a pinnatifid apex (*D. serrulata* and others).

Guadeloupe: L'HERMINIER nr. 130 (B, herb. Mus. Paris).

Porto Rico: SINTENIS nr. 5819 (B, C, W), 6268 b, 6668 (B); G. P. GOLL nr. 133, 862 (W); A. A. HELLER nr. 6200 (W); UNDERWOOD and GRIGGS nr. 869 (W).

Tobago: BROADWAY nr. 3432 (B).

Trinidad: HART nr. 561 (W).

var. *leptocladia* (Fée).

Syn. *Goniopteris leptocladia* Fée 11. mém. 63 tab. 16 fig. 3. 1866.

Differs from the type, with which it agrees in pubescence and setose sporangia, by its more numerous pinnæ (10—12 pairs), which are more deeply cut into sub-acute lobes generally longer than broad; the pinnatifid apex is proportionally shorter than that of the type; base of pinnæ as a rule subcordate; only the two, rarely three lower veins united.

Guadeloupe: L'HERMINIER nr. 131 (B, C, authentic specimens); Père DUSS nr. 234 (C), 4115 a (W).

Martinique: Père DUSS nr. 4146 (RB).

Porto Rico: UNDERWOOD and GRIGGS nr. 888 (W; form. approaching the following variety).

var. *sub-auriculata* Kuhn in sched.

Syn *Aspidium asplenioides* f. *exindusiatum* Kuhn; Krug, Engl. Jahrb. 24: 119. 1897.

Dryopteris asplenioides f. *exindusiata* Urb. Symb. Antill. 4: 18. 1903.

Likely a new species, but in pubescence, setose sporangia and long pinnatifid apex agreeing with *D. hastata*, from which it differs by its large number of much smaller pinnæ, 4—8 cm long, 1 cm broad, the lower ones rather reduced, subsessile, the middle ones adnate to rachis, obtuse auricled on both sides of the base, the upper ones confluent, crenate or shallowly and bluntly lobed. Veins

4—5-jugate, the lowermost pair anastomosing. In size, colour and venation it resembles very much *D. asplenioides*, which, however, is indusiate and pinnate to short of the apex with most of the pinnæ stalked; in our variety long simple hairs are few or none on rachis and costæ beneath, which are stellato-puberulous, in *D. asplenioides* long hairs as a rule are more numerous than the stellate ones.

Haïti: Port au Prince, PICARDA nr. 386 (C), 734 (B) — prope Mariani, PICARDA nr. 377 (B) — San Domingo, ad Rio Mameges, EGGERS nr. 2656 (B, C) — v. TUERCKHEIM nr. 2576 (B).

Porto Rico: SINTENIS nr. 5661 (B, C, CC); GOLL nr. 1016 (W).

228. *Dryopteris pyramidata* (Fée) Maxon, Contr. U. S. Nat. Herb. **10**: 489. 1908.

Syn. *Goniopteris pyramidata* Fée, 11 mém. 61. tab. 16 fig 2. 1866.

Dryopteris latiuscula Maxon. Contr. U. S. Nat. Herb. **10**: 498. 1908.

Nephrodium subcuneatum Bak. Flor. bras. **1**²: 487. 1870; Syn. Fil. 503.

Jenman, W. Ind. and Guiana Ferns 234. 1908!

Dryopteris subcuneata O. Ktze. Rev. **2**: 813. 1891; C. Chr. Ind. 295.

“*Nephrodium subovatum* Jenman, “Argosy”, Demerara”. (t. JENMAN).

Type from Guadeloupe, leg. L'HERMINIER (Herb. Cosson, Paris! and authentic specimens in B and C).

A most distinct and uniform species, excellently described by JENMAN and MAXON (loc. cit.). It resembles in size, colour and texture *D. tetragona*, from which it can be distinguished at once by the lamina being gradually narrowed upwards and by its venation. From the allied species without terminal pinnæ it differs by its most pinnæ being distinctly stalked. The lamina is glabrous; the rachis and costæ beneath excepted, which are puberulous by very minute forked or simple hairs. Lower pinnæ narrowed towards the base, generally not reflexed or abbreviated, upper ones with a truncate base, all scarcely incised one third to the costa. Lobes scarcely longer than broad, truncate and often emarginate at the apex. Veins 8—10-jugate the lower 3—4 much curved, connivent to sinus, or the lower pair occasionally united and sending a branch to the sinus; often the anterior basal vein ends in the leaf-tissue, not reaching the opposite posterior one. Sori medial, furnished with a small, ciliate indusium; head of sporangium glabrous, but its pedicel bears normally a stiff hair. — Rhizome obliquely erect or decumbent; stipe 40—60 cm long, lamina 35 cm × 20 cm; pinnæ 12 × 2¹/₂ cm. Rachis is sometimes gemmiferous in the upper part.

D. latiuscula Maxon is exactly typical and *N. subcuneatum* Bak. is the same. The specimen from S. Domingo referred by MAXON to this species and to which the combination *Dryopteris pyramidata* first was applied, is not so typical, still scarcely different. It has the rachis and costæ beneath clothed with numerous long, whitish hairs, and its pinnæ are incised about halfway to the costa. — *D. pyramidata* seems to be a rather common species in Guiana and the southern West-Indian islands. I have examined the following specimens:

- Guadeloupe: L'HERMINIER (B, C), PÈRE DUSS nr. 4054, 4116 (W), MAZÉ nr. 989 (B).
 Martinique: PÈRE DUSS nr. 4757 (W).
 St. Vincent: H. et G. SMITH, nr. 89 (B, W), nr. 785 (W).
 Grenada: R. V. SHERRING (W), BROADWAY nr. 3757, 3761, 3763, 3764, 3768 (RB).
 Trinidad: FENDLER nr. 54 (B), BROADWAY nr. 3292 (RB).
 British Guiana: JENMAN (W) — Lower Orinoco, Eleanor Creek, RUSBY and R. W. SQUIRES nr. 128 (W)
 — French Guiana: LEPRIEUR (B, C, W, Kew = *N. subcuneatum*), SAGOT (B).
 Surinam in savannis: A. KAPPLER, ed. HOHENACKER nr. 1776 (B) — HOSTMANN nr. 15 (B), 465 (B, S).
 San Domingo: WRIGHT, PARRY and BRUMMEL nr. 12 (W).
 Bahia: LUSCHNATH nr. 167 (B), BLANCHET (L).

229. *Dryopteris magdalenica* Hieron. Hedwigia 46: 325 tab. 3 fig 2. 1907.

Type from Colombia, ad Rio Magdalena, leg. STÜBEL nr. 371 (B!).

A small species, founded on a single leaf and perhaps not different from the following, from which it recedes by such small differences as the distinctly cuneate base of the lower pinnæ and the more oblique or subfalcate and not very obtuse segments. The rachis is very slightly stellato-pubescent, and the young sporangia are setose. The rachis is gemmiferous below the apex (not figured by HIERONYMUS). The stipe is short, shorter than the lamina, and the basal pinnæ not much reflexed.

230. *Dryopteris paucijuga* (Kl.) C. Chr.

Biolog. Arbejder tilegn. Eug. Warming 84. 1911. — Fig. 31 c.

Syn. *Aspidium paucijugum* Klotzsch, Linnaea 20: 368. 1847.

Nephrodium deflexum J. Sm. (Hk. Bak. Syn. 292, note under *N. refractum*);

Jenman, W. Ind. and Guiana Ferns 234. 1908.

Dryopteris johnstoni Maxon, Contrib. U. S. Nat. Herb. 10: 489. 1908.

Type from Venezuela: Caripe, MORITZ nr. 205 (B!)

A distinct species, excellently described by JENMAN and MAXON (loc. cit.) It is well-marked by its long stipe, which is considerably longer than the lamina, its sessile mostly opposite pinnæ, the lower ones much reflexed, their base truncate or, in the lower ones, more or less narrowed. Lamina practically glabrous, the rachis upwards setose and slightly stellato-pubescent above, sometimes with a bud in the upper part. Pinnæ scarcely incised to the middle into bluntly rounded or even truncate, a little oblique lobes. Veins 8—10 to each side the lower 2—3 much upcurved and running out to the sinus. Sori medial with a setose indusium. Sporangia with a single long hair on the pedicel.

Venezuela: Island of Margarita, J. R. JOHNSTON nr. 192 (W, type of *D. Johnstoni* Maxon) — Caracas, GOLLMER (B).

Trinidad: St. Ann's Hill, HART nr. 316 (B) — JENMAN (W) — FENDLER nr. 54 (W).

Tobago: EGGERS nr. 5628 (B, W), 5807 (B).

Mexico: Chiapas, Ixtacomitan Mts, 120 m, J. M. ROVIROSA nr. 51 (W).

Honduras: Rio Permejo, Depart. Santa Bárbara, 600', C. THIEME ed. DONN. SMITH nr. 5968 (W).

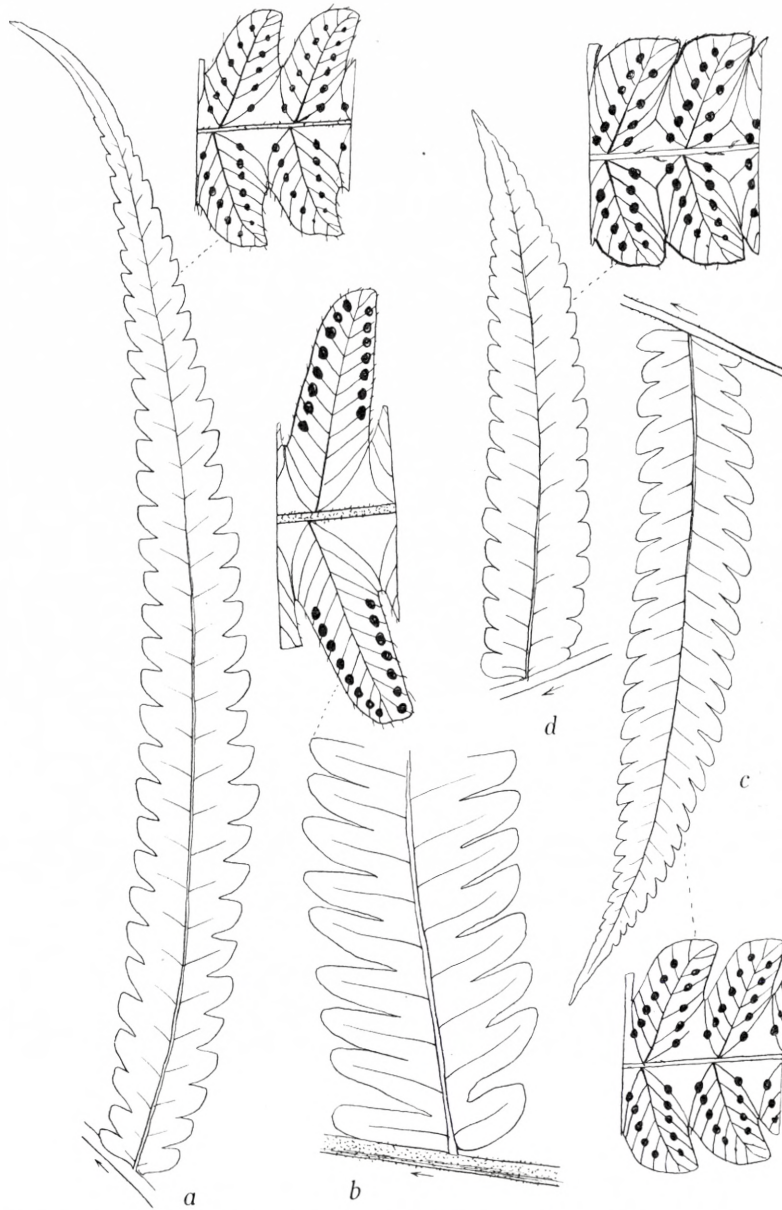


Fig. 31. *a. D. usitata* (Jenm.) C. Chr.; middle pinna (MAXON 1823). — *b. D. venusta* (Hew.) O. Ktze., base of middle pinna (MAXON 1954) — *c. D. paucijuga* (Kl.) C. Chr. (FENDLER 54) — *d. D. anoptera* (Kze.) C. Chr. (orig.) — All pinnae $\times 4\frac{1}{5}$, fragments $\times 1\frac{1}{2}$.

231. *Dryopteris refracta* (Fisch. et Mey.) O. Ktze. Rev. 2: 813.
1891; C. Chr. Ind. 288 pt.

Syn. *Polypodium refractum* Fisch. et Mey.; Kze. Linnaea 23: 283, 321. 1850.
Aspidium refractum A. Br. Ind. sem. ht. Berol. 1856. Mett. Aspid. nr. 238.
Nephrodium refractum Hk. sp. 4: 162 tab. 252. 1862; Bak. Syn. 292.

Type. Founded on cultivated specimens. The species was commonly cultivated in the botanical gardens in the middle of the last century, and I have seen several authentic specimens from various herbaria. It is supposed to be a Brazilian species, but I have seen no specimens from Brazil. Generally it is confounded with *D. riograndensis* (Lindm.), which species is, however, widely different. BAKER (Syn. Fil. 292) supposed *N. deflexum* J. Sm., which is our *D. paucijuga* (Kl.), to be the same, and I am inclined to believe that he was right in this. As a fact *D. refracta* is closely allied to *D. paucijuga*, still there are some differences between the two species, which do not allow me to unite them. In *D. refracta* the lower pair of veins are as a rule truly anastomosing and the 2—3 following veins are connivent to sinus. The peculiar shape of the base of the lower reflexed pinnae is fairly illustrated on HOOKER'S plate 252. Sporangia without setae on the pedicel.

232. *Dryopteris gemmulifera* Hieron. Hedwigia 46: 326 tab. 4 fig. 3. 1907.

Syn. *Aspidium* (resp. *Nephrodium*) *tetragonum* auctt. plur. quoad pl. andin.

Type from Venezuela: Tovar, leg. MORITZ nr. 204 pro parte (B!).

Closely related to *D. scabra* and *D. paucijuga*, but very characteristic by its lamina narrowing very gradually almost from the very base to apex. It is less cut than *D. scabra*, more than *D. paucijuga*; generally the three lower veins run to sinus. It is also larger: stipe 30—40 cm, lamina up to 60 cm. The rachis and costae excepted the leaf is entirely glabrous, even not ciliate; the hairs of the rachis and costae beneath are partly simple and longer, partly very short and stellate.

Colombia: STÜBEL nr. 366, 554, 625 a, 642, 666 (B, for exact localities see HIERONYMUS l. c.); ØRSTED (H) — Santa Marta, H. H. SMITH nr. 994 (C, Rg, W).

233. *Dryopteris usitata* (Jenm.) C. Chr. Index 299. 1905. — Fig. 31 a.

Syn. *Nephrodium usitatum* Jenman, Journ. Bot. 1879: 261. Bull. Dept. Jam. II.
3: 188. 1896; W. Ind. and Guiana Ferns 232.

Type from Jamaica, leg. JENMAN (non vidi).

Scarcely different from *D. venusta*, and probably it is a form of it with narrower pinnae. Its best distinguishing marks are: the long-acuminate apex of the lamina and pinnae, its herbaceous texture, its numerous (20—30 to each side) long and narrow pinnae, which are up to 20 cm long by 1½—2 cm broad, sessile, the lower ones generally shorter, incised ⅓ or more to the costae into broad, blunt oblique lobes, which are a little longer than broad. Both surfaces naked or very

slightly hairy on rachis and costæ by minute stellate and a few longer, simple hairs. Veins 6–8-jugate, the lower ones connivent to sinus or more often united into a branch to the sinus. Sori about medial; indusium small, soon evanished. — The erect, thick rhizome is clothed with dull-brown ovate scales and a few small fibrils are found on the stem and the lower part of the rachis.

To this species I refer some few specimens from

Jamaica: HART nr. 315 (W) — Mansfield, MAXON nr. 1823 (= UNDERWOOD nr. 2789) (W) — Bath, MAXON nr. 1866 (= UNDERWOOD nr. 2826) (W) — Cascade Portland, D. WATT nr. 227 (RB).

From this species I cannot with certainty distinguish *Nephrodium calcareum* Jenm. Journ. Bot. 1886: 271. Bull. Dept. Jam. II. 3: 162. 1896, Jamaica, SHERRING (Kew, auth. specimen), HART 344 (W). It has the lower pinnæ more distinctly reduced, the most pinnæ are somewhat auricled on both sides and the rachis and costæ beneath more densely stellate-puberulous; the pinnæ are shorter and like the apex of the lamina not so long-acuminate.

234. *Dryopteris venusta* (Hew.) O. Ktze. Rev. 2: 814. 1891.
C. Chr. Ind. 300. — Fig. 31 b.

Syn. *Aspidium venustum* Hew. Mag. Nat. Hist. II. 2: 464. 1838.

Nephrodium venustum Moore, Gard. Chr. 1855: 677 c. fig.; Bak. Syn. 294;
Jenman. Bull. Dept. Jamaica II. 3: 188. 1896; W. Ind. and Guiana
Ferns 233.

Type from Jamaica (non vidi).

A handsome species, in its most developed form well-marked by its size, submarginal sori and glabrous indusium. It resembles not a little *D. Fendleri*, but it is easily distinguished from that species by its pinnatifid apex. — The thick erect rhizome is clothed with large, brown scales. Stipe strong, quadrangular, up to 50 cm long, slightly scaly like the lower part of rachis. Lamina 7–9 dcm long, gradually narrowed into a pinnatifid apex, downwards a little reduced. Rachis minutely puberulous by stellate hairs. Pinnæ 20 or more to each side, up to 25 cm long by 4 cm broad, incised halfway to the costa or more, sessile, or the lower ones very shortly stalked, acuminate, the lower generally more or less shortened; surfaces glabrous except the costæ beneath, which are minutely stellato-puberulous, the margins ciliate. Texture firm, membranous, colour dark-green; underside often minutely warted. Lobes broad, oblique, subacute or obtuse. Veins about 10-jugate, the basal pair connivent to sinus or frequently united into a branch to sinus. Sori supramedial or submarginal, furnished with a large, persistent, glabrous indusium. Sporangia glabrous.

Known from Jamaica only; I have seen the following specimens: Mt. Diabolo, MAXON nr. 1855, 1933, 1954, 2318 (W).

235. *Dryopteris riograndensis* (Lindm.) C. Chr. Ind. 289. 1905.

Syn. *Polypodium riograndense* Lindm. Ark. för Bot. 1: 230 tab. 3 fig. 6. 1903.

Aspidium refractum Hieron. Engl. Jahrb. 22: 374. 1906 (non A Br).

Nephrodium refractum auctt. plur. quoad pl. brasil.

Dryopteris refracta Ros. Hedwigia 46: 131. 1907.

Type from Brazil: Minas Geraes, Caldas, leg. MosÉN nr. 2170 (S! Rg).

A very uniform, small species, which unrightly has been identified with *Aspidium refractum* A. Br. It is however certainly a near ally of *D. scabra*, from which it differs by the pinnæ being serrate only and the lower pair of veins being constantly anastomosing. The rachis is above rather densely stellato-puberulous, otherwise the leaf is almost quite glabrous; sometimes the costæ beneath bear some white hairs. The rhizome is decumbent or shortly creeping, a little scaly. Stipes 1—2 dcm long, stramineous like the rachis and costæ. Lamina 12—20 cm long, scarcely narrowed downwards, rather suddenly narrowed into a pinnatifid apex upwards. Pinnæ all sessile, opposite, 5—7 cm long, 1 cm broad, dark-green, herbaceous, the margins only serrate, rarely subentire or lobed. Veins about 3 to a side, the basal ones united or running side by side to the sinus. Sori medial, exindusiate. Sporangia glabrous. — The rachis is often gemmiferous.

Evidently a common species in South Brazil and adjacent countries. I have the following specimens:

Brazil: Minas Geraes, Caldas, MosÉN nr. 2170, 4636 (Rg) — *Sta. Catharina*, PABST nr. 798 (B) — Rio Grande do Sul: Piratiný, LINDMAN nr. A. 865 (Rg); Cachoeira, MALME nr. 984 (Rg); LINDMAN nr. 1167 a; Silveira Martins, LINDMAN nr. 1167 b (Rg). — Further the specimens quoted by ROSENSTOCK loc. cit. and distributed by him as *Nephrodium refractum*, Fil. austr. bras. exs. nr. 84 and 250 (B, C, Rg, W).

Uruguay: Puerto del tanze, BERRO nr. 1260 (C) — Isla San Gabriel, BERRO nr. 2367 (C, CC).

Argentina: Misiones, Bonpland, EKMAN nr. 8 (Rg, S) — Entrerios, Arroyo Yucharichico, LORENTZ nr. 797 (B).

Paraguay: Coaguzu, BALANSA nr. 310 (CC).

236. *Dryopteris scabra* (Presl) C. Chr. Biolog. Arbejder tilegn. Eug. Warming 84. 1911 — Fig. 32.

Syn. *Polypodium scabrum* Presl, Del. Prag. 1: 169. 1822.

Lastrea scabra Presl, Epim. bot. 41. 1849.

Polypodium tetragonum auctt. quoad plant. austro-brasil.

Nephrodium tetragonum auctt. quoad plant. brasil. (Bak. Fil. bras.; Syn. Fil. etc.).

Dryopteris pseudotetragona Rosenst. Hedw. 46: 119. 1907.

Type from Brazil, ad Mathias Ramos, leg. POHL (hb. PRESL!).

Rhizome creeping, clothed at the apex with brown, stellato-pilose scales. Stipe greyish-yellow, bisulcate, shortly pubescent, 20 cm long. Lamina ovato-lanceolate, 20—25 cm long, 15 cm broad, dark-green, firmly herbaceous, upwards rather suddenly narrowed into a pinnatifid apex and generally proliferous at the base of the upper pinnæ. Rachis slender, rather densely and shortly hairy by simple and stellate hairs, which latter mostly occur on the upperside of the upper part of the

rachis. Pinnæ opposite or nearly so, sessile 8—9 cm long, $1\frac{1}{2}$ —2 cm broad acuminate, the basal pair deflexed and narrowed towards their base, the upper ones divaricating and broadest at the base, ciliate, the costæ above strigose, the upper-side glabrous or very slightly and shortly hairy, costæ and costulæ beneath with patent, simple hairs, the underside otherwise nearly glabrous. Segments oblique or subfalcate, obtuse or subacute, the lower ones of the basal pinnæ short. Veins simple, 10—11-jugate, the lower 2 running to the sinus, where their apices are separated by a pale membrane. Sori medial, with a pilose, persistent indusium. Sporangia glabrous.

The diagnosis above is of the original specimen. With this agree a large number of specimens from Southern Brazil in almost all characters, although I have not seen another specimen, which exactly matches the original one, but it is sure that all these specimens belong to the same species, which is evidently very common from Rio to Rio Grande. Several of the specimens were labelled *Nephrodium tetragonum* Hk. resp. *Dryopteris pseudotetragona* Urb., others *Polypodium tetragonum*. From the andine form of the former as previously understood, now *D. gemmulifera* Hieron., *D.*

scabra differs by the short pinnatifid apex of the lamina, from the latter, which it resembles in habit and colour, by its free veins, sessile pinnæ and its pinnatifid apex without a distinct terminal pinna.

D. scabra is a very variable species; the specimens seen can be grouped as follows:
var. **incompleta** (Lindm.)

Syn. *Polypodium tetragonum* var. *incompletum* Lindm. Ark. för Bot. 1: 229 tab. 9 fig. 7. 1903.

Dryopteris pseudotetragona var. *foecunda* Rosenst. Hedwigia 46: 119. 1906.

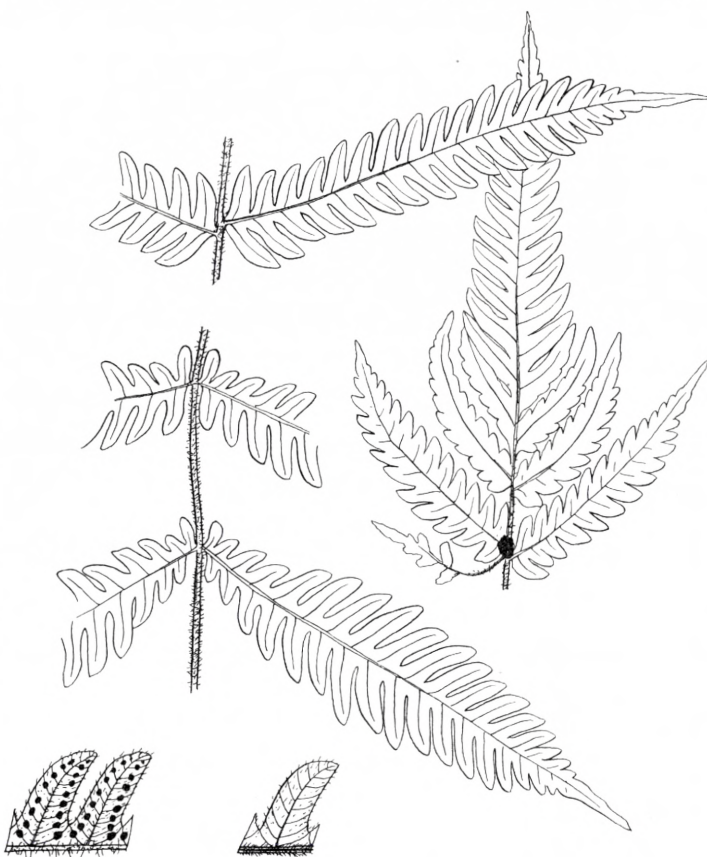


Fig 32. *D. scabra* (Pr.) C. Chr. leg. POHL. Basal pinnæ, middle pinna and apex of leaf $\times \frac{4}{5}$; segments seen from both surfaces $\times 1\frac{1}{2}$.

Identical with the type in most characters, differing by a longer stem (up to 5 dm long), the very slender rachis, which is practically quite glabrous (only stellate hairs above), and the almost glabrous leaf. Sori yellow, apparently exindusiate. Rachis as a rule with gemmæ and in some specimens gemmæ also on the costæ of the pinnæ above.

Rio Grande do Sul: Silveira Martins, LINDMAN nr. A 1311 (Rg, W) — Campeste dos Sairaes, C. JÜRGENS, ROSENSTOCK: Fil. austr. bras. exs. nr. 375 (B, R, Rg) — Sta. Cruz, JÜRGENS nr. 200 (R); *ibid.*, ROSENSTOCK: Fil. austr. bras. exs. nr. 86 (B, R) — Porto Alegre, MALME nr. 1441 (Rg).
São Paulo: Rio Tieté, GERDER nr. 82 (R).

To this variety I also refer the majority of the specimens by ROSENSTOCK named *D. pseudotetragona* var. *gemmulifera* Hier. with the forma *major* (Hedwigia 46: 119). Some of them are larger and of a more firm texture and a greyish colour, but they do not differ materially probably; they are old stages of the common form.

var. *Caesariana* (Christ).

Syn. *Aspidium Caesianum* Christ, Denkschr. Akad. Wien 69: 14. (1906) 1907 tab. 3 fig. 1.

Differs from the type and the var. *incompleta* by the less incised pinnæ, segments close, acute; 2 pairs of veins connivent to sinus. Resembles in habit perfectly *D. lugubris* var. *devolvens* from which it differs in pubescence.

São Paulo: Cerqueira Cesar, 500 m, WETTSTEIN & SCHIFFNER (hb. Wien!) — Tieté, GERDER nr. 85 a (R).
Rio Grande do Sul: Sta. Cruz, JÜRGENS, ed. ROSENSTOCK: Fil. austr. bras. exs. nr. 87 (R, Rg).

With this variety agrees closely an authentic specimen of *Dryopteris bifrons* Christ in Fedde, Repert. 6: 350. 1909, which was collected by ROJAS in Paraguay, ed. HASSLER nr. 10455 (RB!). The indusium is very small and bears some few long stiff setæ. Another specimen from Paraguay: Cordillera de Altos, FIEBRIG nr. 95 (B) is the same. It is a large form, leaf said to reach 1—1,2 m, and the rachis is richly bulbiferous, but it does not differ materially from *D. scabra* var. *Caesariana*.

237. *Dryopteris monosora* (Pr.) C. Chr. Biolog. Arbejder tilegn. Eug. Warming 84. 1911. — Fig. 33.

Syn. *Polypodium monosorum* Presl, Tent. 181. 1836 (nomen).

Lastrea monosora Presl, Epim. 36. 1849.

Aspidium monostichum Kze.; Mett. Aspid. nr. 228. 1858.

Dryopteris tristis part. C. Chr. Ind. 298. 1905.

Type from Rio leg. POHL (Herb. PRESL!).

A distinct species, improperly referred to *D. tristis* by BAKER in Flor. bras. and Syn. Fil. It resembles *D. tristis* in the cuneate base of the lower pinnæ, but differs by its creeping rhizome, pinnatifid apex and by the presence of small scales on

rachis and costæ beneath. It is excellently described by METTENIUS and I add here only the following comparative remarks.

The short-creeping rhizome is at the apex rather densely clothed with ovate, brown, stellato-pilose scales. The strong stipes are up to 4 dcm long, and like the rachis and costæ beneath furnished with some small, brown scales. The rachis is minutely pulverulent by stellate hairs, and the costæ of both sides bear a few long hairs, otherwise the lamina is practically glabrous. Lamina 6—7 dcm long, 2—3 dcm broad, upwards rather suddenly narrowed into a pinnatifid apex. Pinnæ 15 cm long, $2\frac{1}{2}$ —3 cm broad, the lower ones shortly stalked and their base distinctly cuneate but shorter than in *D. tristis*, the upper ones sessile with truncate base, their basal segments somewhat abbreviated. Pinnæ incised a little above the middle into close, sub-falcate, acute or often submucronate segments, 5 mm broad. Veins simple, 9—10-jugate, the basal ones connivent to sinus. Sori medial, furnished with a small, deciduous, ciliate indusium. — Texture membranous, colour dark- or greyish green, generally brown when dried, surfaces often shining.

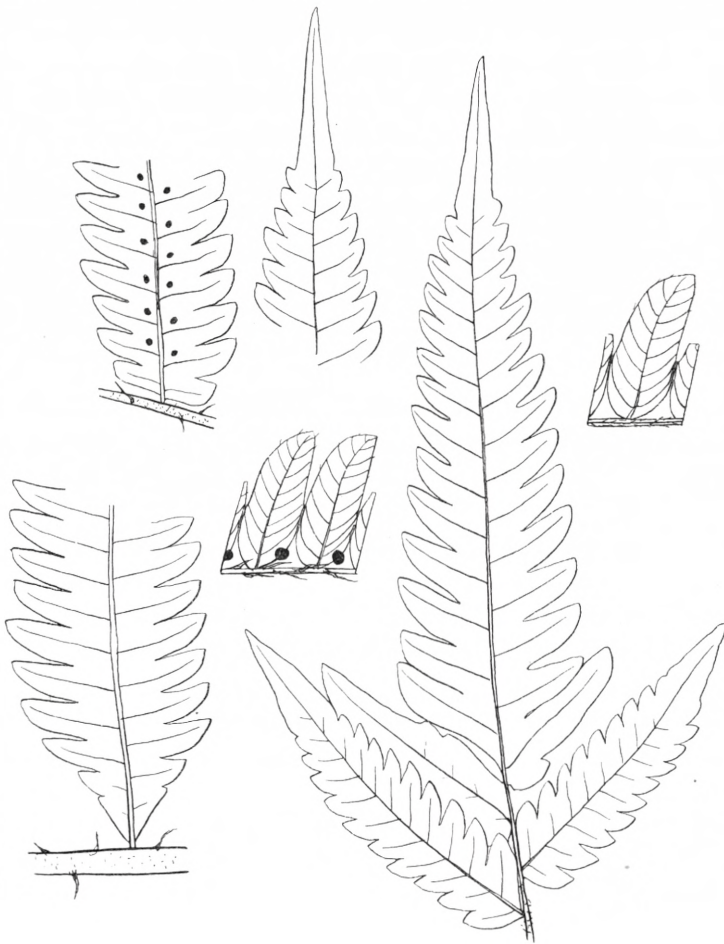


Fig. 33. *D. monosora* (Pr.) C. Chr., leg. POHL. Base of basal pinna, base and apex of a middle pinna and apex of a leaf $\times \frac{4}{5}$; segments seen from both surfaces $\times 1\frac{1}{2}$.

The nearest Brazilian relative of *D. monosora* is *D. scabra*, which is smaller and has all the pinnæ sessile, their base not cuneate, entire; further it has fewer veins, of which only the basal pair run to sinus.

D. monosora seems to be restricted to the forests of Rio and São Paulo; it occurs in two forms:

1. f. *typica*.

Rachis without buds; veins 9—10-jugate, the lower 4—5 connivent to sinus; only the anterior basal vein soriferous. Segments generally more acute than in the following form.

Hereto the type-specimen and the following: São Paulo: Rais da Serra, WACKET nr. 224 (R) — Ins. S. Sebastian, CASARETTA nr. 130 (Hb. PRESL; B).

2. var. *Schiffneri* n. var. (*D. Schiffneri* mihi in Herb. plur.).

Rachis often gemmiferous. Veins 13—15-jugate; the lower 3—4 connivent to sinus, about all soriferous. Segments often with rounded apices. Costæ less scaly.

I had described this variety as a new species, but I now consider it the fully developed form of *D. monosora*.

São Paulo: prope Rio Grande ad São Paulo Railway, 800 m., WETTSTEIN et SCHIFFNER nr. 462 (Herb. Mus. Wien) — prope Fazenda bella vista ad flumen Rio Pardo, c. 500 m, WETTSTEIN & SCHIFFNER VII. 1901 (Herb. Wien) — Santos, MOSÉN nr. 3088 (Rg) — Rais da Serra, WACKET nr. 200 (R) — BURCHELL, Cat. pl. bras. nr. 3065 (B) — Dr. BRENNING (B).

238. *Dryopteris Eggersii* (Hieron.) C. Chr. Ind. 263. 1905. — Fig 34 a.

Syn. *Nephrodium Eggersii* Hieron. Engl. Jahrb. 34: 441. 1904.

Aspidium nutans Christ, Bull. L'Herb. Boiss. II. 6: 286. 1906.

Dryopteris nutans Christ, Bull. L'Herb. Boiss. II. 7: 261. 1907.

Nephrodium tetragonum Sod. Cr. vasc. quit. 249. 1893 (pro parte?).

Type from Ecuador, El Recreo, leg. EGGERS nr. 15319 (B!).

A weakly characterized species of the same general aspect as *D. nephrodioides*, *D. lugubris* and allied species. From *D. nephrodioides* it differs by the absence of stellate hairs on the leaf-tissue and by the presence of large, brown scales on the erect rhizome and the basal part of the stems. From *D. lugubris*, which it resembles closely, it differs by its erect rhizome, thinner texture, fewer veins and, especially, by the absence of scales on rachis and costæ beneath. A good character is also the shape of the stellate hairs of rachis; they bear on a stalk 3—4 branches, which are again forked. Lamina 7—8 dcm long with 20—25 pairs of pinnæ, 15 cm long by 2 cm broad. Rachis densely pulverulent by short stellate hairs and upwards furnished with several long, white hairs. Upper surface glabrous except the strigose costæ and ciliate margins, under-surface throughout finely pubescent by simple hairs, the costæ besides densely stellato-pulverulent. Veins 10—12-jugate, simple, the 2—3 lower ones connivent to sinus. Sori medial, the indusium subpersistent, setose by simple hairs. Sporangia glabrous or rarely furnished with a few setæ. — From *D. gemmulifera* it differs by its denser pubescence of stellate hairs, absence of gemmæ and by its lamina being shortly narrowed upwards, not gradually tapering to the point.

D. nutans Christ from Costa Rica is this species; the specimens are larger than the original one, dark-green and less pubescent beneath. *N. tetragonum* Sod.,

represented by an authentic specimen (C), is a large form of *D. Eggersii* with pinnæ 25 cm long.

Ecuador: El Recreo, EGGERS nr. 15319 (B); Llalla, SPRUCE nr. 5668 (RB); Andes quitenses SODIRO (C).
Colombia: SMIDTCHEN (B); SCHLIM (B).
Costa Rica: Navarro, WERCKLÉ (C, W); Llanuras de San Carlos, C. BRADE nr. 483 (R).

239. *Dryopteris biformata* Rosenst., Fedde, Repert. 7: 300. 1909. — Fig 34 c.

Type from Peru: Tarapoto, SPRUCE nr. 4037 (RB!).

A rather doubtful species, marked by its contracted fertile pinnæ and segments; this may be an individual character, and the species can not be said to be well understood from the original specimens alone. The very remote, stalked

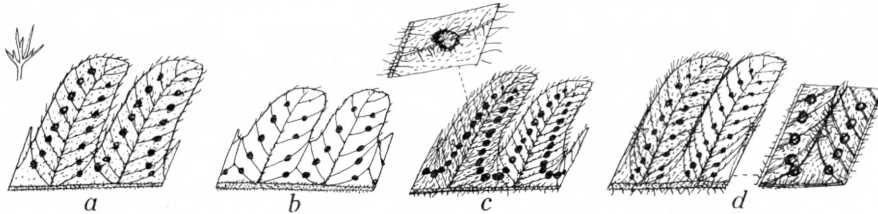


Fig. 34. Segments of a. *D. Eggersii* (Hieron.) C. Chr. (orig. of *A. nutans* Christ, with a hair from the rachis). — b. *D. equitans* (Christ) C. Chr. (orig.). — c. *D. biformata* Ros. (orig., with a fragment $\times 4$). — d. *D. lugubriiformis* Ros. (orig.) — all $\times 1\frac{1}{2}$.

pinnæ give the leaves a peculiar habit; the sterile pinnæ resemble those of *D. tristis*, but they are much more hairy and the lower ones not with a cuneate, entire base. The rachis is gemmiferous. The mature sori form a continuous line. Rachis densely stellato-pulverulent without long hairs.

240. *Dryopteris equitans* (Christ) C. Chr. comb. nov. — Fig 34 b.

Syn. *Nephrodium equitans* Christ, Bull. l'herb. Boiss II. 6: 163. 1906.

Type from Costa Rica: Navarro 1400 m, leg. WERCKLÉ (C!).

Although this species resembles *D. tetragona* in having a rather distinct terminal pinna and the basal pair of veins being truly anastomosing, it no doubt is a near ally of *D. Eggersii* and its proper place is in this section. It differs from *D. tetragona* in its erect rhizome, distinct indusium and densely pulverulent rachis and costæ beneath, from *D. Eggersii* in its anastomosing basal veins and apex of frond, from *D. nephrodioides* var. *Biolleyi* by the absence of stellate hairs on the leaf-tissue and indusium. — The dark-green, membranous pinnæ, which are up to 15 cm long, $1\frac{1}{2}$ –2 cm broad, are scarcely incised to the middle, above very slightly and shortly pubescent, the costæ and costulae beneath pulverulent by stellate hairs but without long hairs. The rachis is pulverulent by very small stellate hairs, which on a short pedicel bear 3–4 very short and generally simple branches. Lobes a little oblique, obtuse with open sinuses between. Veins 6–8-jugate, those

of the lower pair truly anastomosing and sending a branch to the sinus, where the next pair meet. Sori medial, small, furnished with a small, ciliate indusium. Sporangia glabrous. — The terminal pinna is not so distinct as in *Eugoniopteris*; it is broader and deeply lobed at base, but the basal lobes is much shorter than the uppermost pair of lateral pinnæ.

A have seen the type-specimens only.

241. *Dryopteris curta* Christ, Bull. L'Herb. Boiss. II. 7: 263. 1907. (p. p.) — Fig. 35.

Type from Costa Rica: buissons et broussailles de Tuis, 650 m, leg. A. TONDUZ nr. 11323 (C!, W).

Habit of *D. Eggersii* and *D. scabra* but smaller and its rachis very hairy by hairs of two kinds intermixed: 1) numerous, short stellate hairs with 3—5 short, simple branches on a short stalk, and 2) rather numerous, much longer, patent hairs, which often are cleft at the apex. — Stipe 3—4 dcm long, sulcate, stellato-pulverulent and with scattered small, flat scales. Lamina membranous, 3—4 dcm long, broadest at the base, upwards gradually narrowed into a pinnatifid apex. Pinnæ all sessile, 6—7 cm long, 1½ cm broad, the edges nearly parallel, truncate at base, shortly obtuse at the point, the basal pairs reflexed, the upper ones horizontal, the upperside throughout hairy by numerous adpressed antrorse simple hairs; costæ beneath very hairy like rachis, veins and leaf tissue finely pubescent by simple, erect hairs. Pinnæ incised scarcely more than halfway down to the midrib into close, falcate, obtuse, entire segments. Veins 8—9-jugate, simple or, not rarely, forked, the lower 2—3 connivent to sinus. Sori medial, furnished with a subpersistent, setose indusium. Sporangia glabrous.

In the most complete specimen (W) the rachis bears a small gemma.

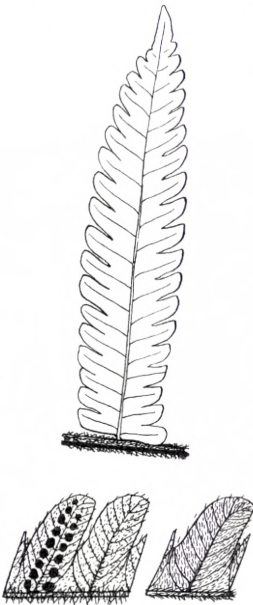


Fig. 35. *D. curta* Christ. Pinna $\times \frac{4}{5}$ and segments seen from both surfaces $\times 1\frac{1}{2}$ (orig.).

242. *Dryopteris heterotricha* n. sp. — Fig. 36.

Syn. *Dryopteris nephrodioides* var. *setulosa* Hieron. Hedwigia 46: 327. 1907.

Type from Ecuador, Mt. Tunguragua, leg. SPRUCE nr. 5298 (H, L, RB), and gathered in the same locality by STÜBEL nr. 849 (B) and in valle Pastaza by the same nr. 931 a (B).

Rhizomate?. Stipitibus ad 1 dcm longis, quadrangularibus, brevissime stellatim pulverulentis, versus basin sparse squamosis, squamis adpressis, ferrugineis, sparse stellato-ciliatis. Lamina 6—7 dcm longa, bipinnatifida, versus apicem pinnatifidum sensim attenuata, herbacea, atroviridi. Rachi pilis stellatis brevissimis dense pulverulenta et pilis cylindricis, crassis, rufis, nitidis apicibus sæpe furcatis onusta,

ad basin pinnarum superiorum interdum bulbifera. Pinnis remotis, alternis, subhorizontalibus, inferioribus breviter petiolutatis, superioribus sessilibus, oblongis, 10—14 cm longis, 2 $\frac{1}{2}$ cm latis, longe acuminatis, inferioribus vix brevioribus versus basin breviter attenuatis, superioribus basi truncatis, supra ubique pilis adpressis simplicibus deciduis sparse strigosis, ad costas pilis cylindricis rufis dense setosis, infra inter venas glabris, ad costas costulasque pilis similibus pilis stellatis brevissimis intermixtis hirtis, ad alam 4—5 mm pinnatifidis. Laciniis parum obliquis, obtusis vel subacutis, versus apicem leviter crenatis. Venis simplicibus, 10—11-jugis, basalibus duabus ad sinum conniventibus. Soris medialibus. Indusiis subpersistentibus, pilis simplicibus dense setosis. Sporangiiis glabris.

By its peculiar pubescence different from all allied species with exception of *D. curta* and *D. lugubriformis*. Dr. Hieronymus referred Stübel's specimens to *D. nephroides*, the pubescence and venation of which are totally different.

243. *Dryopteris lugubriformis*

Rosenst. Fedde, Repert. 7: 299. 1909. — Fig. 34 d.

Type-specimen from Peru orient.: Tarpoto, Spruce nr. 4749 (RB!).

Closely allied to the preceding species, but leaf firmer, grey-green, throughout more densely hairy, especially above, terminating in a subsimilar terminal pinna, and the lower 2—3 pairs of veins connivent to sinus; by these two last characters it resembles *D. tristis* and allied species, but its proper place seems to be here. Rachis gemmiferous above, sori inframedial, small, clothed with a hirsute, persistent indusium. The long hairs of rachis and costæ are rarely red and far more numerous but thinner than in *D. heterotricha*; rachis upwards especially densely hirsute, the edges densely ciliate.

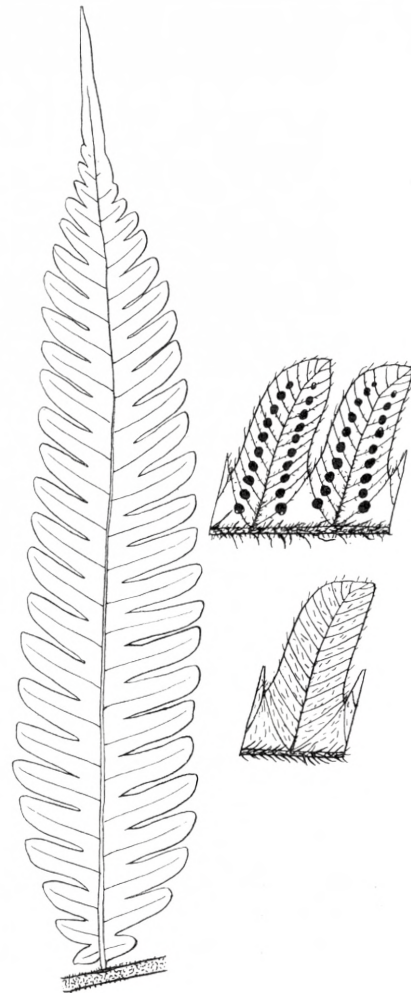


Fig. 36. *D. heterotricha* n. sp. The second pinna from below $\times \frac{4}{5}$ and segments seen from both surfaces, $\times 1\frac{1}{2}$.

244. *Dryopteris Schwackeana* Christ msc. n. sp. — Fig. 37.

Type from Brazil: Minas Geraes, Ouro Preto, locis humidis, leg. Schwacke nr. 14892—14893 (C!).

Rhizomate repente, squamis brunneis stellato-ciliatis instructis. Stipitibus quadrangularibus, griseis, ad 20 cm longis, brevissime stellato-pulverulentis et squamis paucis deciduis onustis. Lamina ovato oblonga, 15—25 cm longa, medio ad 10 cm lata, bipinnatifida, in apicem pinnatifidum abrupte attenuata, herbacea, luteo-viridi. Rachi pilis simplicibus longioribus pilis stellatis minutis intermixtis subdense tomentosa. Pinnis 9—10-jugis, alternis, inferioribus reflexis, mediis horizontalibus, sessilibus, oblongis, mediis 6 cm longis, $1\frac{1}{2}$ cm latis, apice abrupte acutis, rarius acuminatis, basi truncatis, inferioribus versus basin parum attenuatis, supra costa excepta strigosa glabris, subtus ad costas costulas venasque pilis mollibus albidis simplicibus et stellatis (his brevioribus) hirtis, vix ad medium pinnatifidis. Laciniis approximatis, obliquis, acutis, basali superiore sæpe longiore. Venis simplicibus, 6—7-jugis, 3—4 ad sinum conniventibus. Soris medialibus, indusiis dense setosis. Sporangiiis glabris.

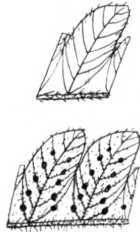


Fig. 37.
D. Schwackeana n. sp. Pinna $\times \frac{4}{5}$ and segments seen from both surfaces. (MOSÉN 4616).

A small species in habit not unlike certain forms of *D. mollis*, but venation and stellate pubescence show clearly that it belongs to the group of *D. lugubris*. By its reflexed lower pinnæ it resembles *D. lugubris* var. *devolvens* and *D. scabra*, from the first it differs by its small size, few veins, herbaceous texture etc., from the latter by 3—4 connivent veins the pinnæ scarcely narrowed towards the base and less incised and in its not gemmuliferous rachis. — Further specimens:

Minas Geraes: Caldas, MOSÉN nr. 4616 (Rg) — Lagoa Santa, WARMING (H).
São Paulo: Campiñas, HEINER nr. 551 (Rg).

245. *Dryopteris lugubris* (Kze.) C. Chr. Ind. 276. 1905. — Fig. 38.

Syn. *Polypodium lugubre* Kze. msc.

Aspidium lugubre Mett. Aspid. nr. 230. 1858.

Aspidium catacolobum Kze.; Ettingsh. Farnkr. 182 tab. 126 f. 9, 10 1865 (t. spec. in hb. PRESL).

Type from Rio, leg. POHL (Herb. PRESL!)

In general habit very like *D. nephrodioides* and *D. Eggersii* but well-marked by its creeping rhizome and the presence of small brown scales on the rachis and costæ beneath. Stipe 20—30 cm. long and like the rachis quadrangular and densely pulverulent by very short stellate hairs. Lamina up to 1 m long, dull-green, firmly herbaceous or membranous, the upperside throughout shortly pubescent, the costæ strigose by antrorse hairs, the underside less hairy, most so on costulæ and veins, the hairs generally simple; costæ beneath pulverulent by short stellate hairs and furnished with some few stellato-ciliate small scales. Pinnæ sessile 15—18 cm long, $2\frac{1}{2}$ —3 cm broad, acute or shortly acuminate, alternate, remote, subhorizontal, the lower ones not reflexed, their base shortly attenuate in the lower, truncate in the upper ones, incised about $\frac{2}{3}$ of the

way down into entire, acute or subobtusate segments; upper basal segment of lower pinnæ generally a little prolonged and close to the rachis, the lower basal one shorter and remote from rachis. Veins simple, 14—16-jugate, often prominent on the upper side, the basal pair connivent to sinus. Sori medial; indusium small, deciduous, setose. Sporangia glabrous.

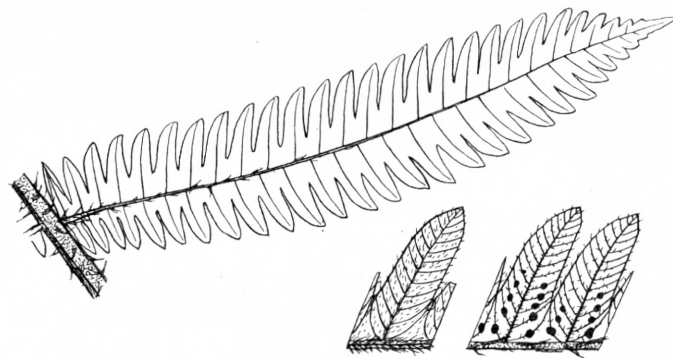


Fig. 38. *D. lugubris* (Kze.) C. Chr., leg. POHL. Pinna $\times \frac{4}{5}$ and segments seen from both surfaces, $\times 1\frac{1}{2}$.

The typical form of *D. lugubris* here described is rather common in Southern Brazil. It was referred to *Nephr. tetragonum* by BAKER in Flor. bras. which also includes our *D. scabra*, from which species it differs in pubescence and size. I have seen the following specimens:

Minas Geraes: Caldas, MOSÉN nr. 2157, 2159 (Rg), 2160 (H, Rg); G. A. LINDBERG nr. 558 (B); REGNELL nr. III 1450 c (Rg) — Lagoa Santa, WARMING (H). — São Paulo: Serra de Caracal, MOSÉN nr. 2158 (Rg, S) — Matto Virgem, Rio Claro, LÖFGREN nr. 652 (H).

In some of these typical specimens the hairs of the surfaces sometimes are stellate; therefore I refer the following form as a variety to *D. lugubris*.

var. *quadrangularis* (Fée).

Syn. *Aspidium quadrangulare* Fée, Cr. vasc. Brés. 1: 145 tab. 50 fig. 2. 1869. Rio, GLAZIOU nr. 962 (Herb. Cosson, Paris, H).

Underside of lamina throughout like rachis and costæ above densely greyish puberulous by stellate hairs. The lower 3—4 veins run to sinus. Scales fewer. Otherwise typical.

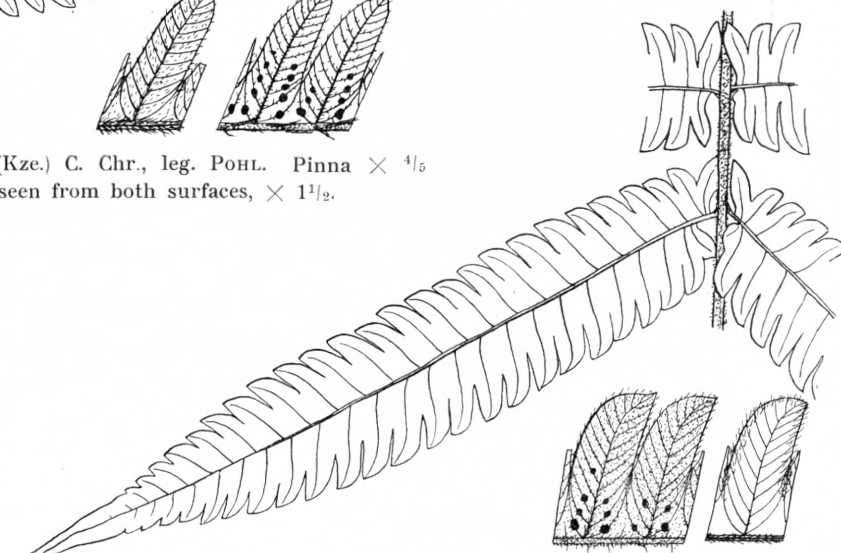


Fig. 39. *D. lugubris* var. *devolvens* (Bak.). Basal pinnæ $\times \frac{4}{5}$ and segments seen from both surfaces, $\times 1\frac{1}{2}$ (GLAZIOU 15766).

var. *joinvillensis* Ros. Hedwigia 43: 225. 1904.

Syn. *Dryopteris joinvillensis* Ros. Hedwigia 46: 120. 1907.

Sta. Catharina: Joinville, SCHMALZ nr. 100 (R).

A very large form: pinnæ 25×4 cm; veins 18–20 to a side. Rachis gemmiferous. Pubescence about as in the former variety, but stellate hairs fewer and scales more numerous.

var *devolvens* (Bak.) — Fig. 39.

Syn. *Nephrodium devolvens* Bak. Journ. of Bot. 1885: 217.

Dryopteris devolvens C. Chr. Ind. 261. 1905.

Differs from the type by 1) size: lamina 3–4 dcm long; pinnæ 12–15 cm long, $2\frac{1}{2}$ cm broad, 2) the basal pinnæ being distinctly reflexed, 3) lamina upwards suddenly narrowed into a broad, pinnatifid apex, 4) segments close, even contiguous, acute, subfalcate; veins 10–12 to a side. In pubescence it does not differ materially; still the scales of rachis and costæ beneath are very few, and the rachis and costæ beneath are clothed with fine, simple hairs besides the stellate hairs. The upperside is hairy towards the margins, the underside finely downy by simple hairs. Veins not prominent.

A distinctly looking variety, well-marked by its close, acute segments and the upwards suddenly narrowed lamina, but I find it impossible to distinguish it specifically from *D. lugubris*. Several of the specimens referred to the type show now one now another of the characters, which mark the variety.

The following specimens are rather uniform:

Rio: GLAZIOU nr. 15766 (B, H, type-number) — Minas Geraes: Caldas, MOSÉN nr. 2156 (Rg, Hb. Brux.) — São Paulo: Piritabo (?), F. W. BAUER nr. 49 (R) — Capivary, GERDER nr. 88 (R) — Campiñas, HEINER nr. 568 (Rg) — Toledo, ULBRICHT nr. 51 (Rg; proliferous) — Matto Grosso: Santa Anna da Chapada, MALME nr. 2131 (Rg).

Synonyms of *D. lugubris* are probably:

Aspidium coadunatum Klf. Enum. 239. 1824 and

Nephrodium inaequale Schrad. Gött. gel. Anz. 1824: 869, both from the vicinity of Rio. A description of the former by METTENIUS is to be found in MS in (B) and from this description it seems to be identical with var. *devolvens*. The name of KAULFUSS has priority, if his species is a form of our *D. lugubris*, and I have no doubt that this is the case. We have thus here a common Brazilian species, which is described as new at least 6 times, viz 1824 by KAULFUSS (*coadunatum*) and SCHRADER (*inaequale*), 1858 by METTENIUS (*lugubre*), 1869 by FÉE (*quadrangulare*), 1885 by BAKER (*devolvens*) and 1907 by ROSENSTOCK (*joinvillensis*). This shows how necessary it is to compare specimens with descriptions and authentic specimens of described species before describing them as new.

Aspidium nitidulum Kze.; Ettingsh. Farnkr. 188 tab. 123 f. 3. 1865 is perhaps the same.

246. *Dryopteris glochidiata* (Mett.) C. Chr. n. sp. — Fig. 40 a.

Syn. *Aspidium glochidiatum* Mett. msc.

Type from Southern Brazil, leg. SELLOW (B!).

Species *D. nephrodioidi* (Kl.) habitu, magnitudine proxime affinis, differt: lamina subtus pilis minutis erectis glochidiformibus ubique praedita, supra pilis maxime simplicibus brevissimis pubescente; soris subcostularibus, sporangiis setis glochidiformibus instructis.

It is possible that this proposed new species is a form of the common Brazilian *D. lugubris*, which it resembles as well as *D. nephrodioides* in habit, size and venation. Still it lacks the scales of rachis and costae beneath, which are found in *D. lugubris*, the sori are distinctly inframedial, and the sporangia are setose by anchor-shaped hairs similar to those, occurring on the under surface. Rhizome short-creeping; stipe 4—4½ dcm long, quadrangular. Rachis and costae beneath densely stellato-pulverulent. Pinnæ 10—11 cm long, 1½—1¾ cm broad. Veins 10 each side, the two lower ones connivent to sinus.

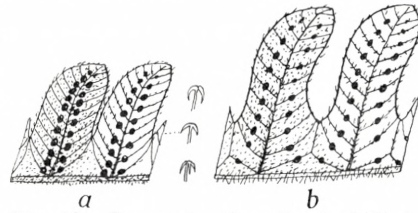


Fig. 40. Segments of a. *D. glochidiata* n. sp., with anchor-hairs from the surface, and b. *D. ancyriothrix* Ros. $\times 1\frac{1}{2}$.

247. *Dryopteris ancyriothrix* Ros. in Fedde, Repert. 7: 305. 1909. — Fig. 40 b.

Type from Ecuador: in monte Guayapurima, SPRUCE nr. 4748 (RB!).

A peculiar, thin-leaved species, resembling *D. glochidiata* by the anchor-shaped, erect hairs of the underside and rachis but otherwise very different by the longer pinnæ, the glabrous upperside and sporangia, exindusiate medial sori, the basal veins united etc. The rachis is not densely pulverulent as in *D. nephrodioides* and related species, still the species has its proper place here.

249. *Dryopteris nephrodioides* (Kl.) Hieron. Hedwigia 46: 327. 1907 (excl. var.).

Syn. *Aspidium nephrodioides* Klotzsch, Linnaea 20: 370. 1847.

Type from Venezuela, Caripe, in sylvis humidis, MORITZ nr. 206 (B!).

A variable species but easily distinguished from almost all other species by the dense pubescence of stellate hairs throughout the whole plant; the hairs of the rachis bear on a short stalk 5—6 short, normally simple branches, those of the surfaces are sessile and bear 3—5 long horizontal branches, which are adpressed to the leaf tissue; generally these hairs can only be seen by aid of the microscope; in certain forms rachis upwards, costae and veins above and the margins are furnished with some few, deciduous, long, simple setae.

The oblique rhizome bears at the top several leaves on long stalks; the leaves have a pinnatifid apex and a large number of alternate short-stalked linear pinnæ, which are long acuminate, a little reduced towards the base and incised

about $\frac{2}{3}$ of the way down to the costa; texture herbaceous, colour dark-green or grey-green. Segments numerous, oblique, obtuse or subacute. Veins 10—11-jugate, the basal ones connivent to sinus. Sori inframedial or submedial, furnished with a persistent, stellato-pilose indusium. Sporangia glabrous.

This species is closely allied to *D. lugubris*, from which it differs mainly by the absence of scales on rachis and costæ beneath and by fewer veins. KLOTZSCH's original specimen is apparently a small leaf of a species, which is known by pteridologists under other names. Best agreeing with the type are some plants from Trinidad, heights of Aripo, Bot. Gard. Herb. nr. 325, 326, 327 (W).

The common West-Indian form of the species is probably quite typical; it differs from the original specimen by its large size; lamina 1 m or more long with 25 or more pairs of pinnæ, which are 20—25 cm long, 2 cm broad; costæ above densely stellato-pubescent but without long, simple hairs; sori medial; basal pair of veins often united, which especially is to be found in the Jamaican and Cuban specimens, but in the same pinna one may find the basal veins free, connivent and anastomosing. This form is

f. *guadalupensis* (Fée).

Syn. *Nephrodium guadalupense* Fée 11 mém. 89 tab. 24 fig. 3. 1866.

Dryopteris guadalupensis O. Ktze.; C. Chr. 269.

Trinidad: Bot. Gard. Herb. nr. 4118 (C).

St. Vincent: H. H. & G. W. SMITH nr. 1348 (C).

Guadeloupe: L'HERMINIER nr. 34 et 132 (B); Père DUSS nr. 4040 (B, C, W), 4032 (RB), 4453 (B, W).

Martinique: Père DUSS nr. 4750 (W).

Porto Rico: BALBIS (B).

Jamaica: Brighton near Hope Bay, ALEX. MOORE (W); JENMAN (W); HART nr. 303 (W).

Cuba: Monte Verde nr. 1009 (B, S), 1010 pt. (B).

var. *Biolleyi* (Christ).

Syn. *Aspidium Biolleyi* Christ, Prim. Fl. Costaric. 3: 31. 1901.

Aspidium guadalupense Christ, Bull. Soc. bot. Belg. 35: 210. 1896.

Dryopteris guadalupensis Christ, Bull. Boiss. II. 7: 264. 1907 (with full description).

Dryopteris asterothrix Rosenstock, Fedde Repert. 7: 305. 1909.

This is the most developed form of the species and it can be easily confounded with *D. megalodus*, from which it scarcely can be distinguished by other characters than its pinnatifid apex and its generally narrower but larger and more deeply cut pinnæ. From f. *guadalupensis*, which it resembles in most characters it differs 1) by the hairs of the underside; they are anchor-shaped, i. e. they bear on a short stalk 2—3 very short recurved branches; the costæ beneath are besides the stellate hairs furnished with long, simple ones; the hairs of the upper surface are like those of the type; 2) basal pair of veins almost constantly united, and 3) indusium small, deciduous, often not seen.

- Guatemala: Cubilquitz, v. TUERCKHEIM ed. J. D. S. nr. 8812 (C); nr. II. 1173 (B)
- Costa Rica: Tuis près Turrialba, PITTIER nr. 11243 (C, type, W) — Forêts de Tsaki, Talamanca, PITTIER nr. 9439 (C, W) — eodem loco, TONDUZ nr. 9464 (B, C, W) — Cartago, POLAKOWSKY nr. 423 (B) — forests of Virris, near la Banilla, BIOLLEY (C) — Hacienda Guacimo, TONDUZ nr. 14585 (W).
- Panama: HAYES nr. 65 (B, W); MAXON nr. 5772 (W), 5748 (W).
- Colombia: Sta. Marta, H. H. SMITH nr. 996 (C) — Salto del Diablo, STÜBEL nr. 677 (B) — Muzo, STÜBEL nr. 526 (B) — La Vega, LINDIG nr. 332 (B) — Tocarema, LINDIG nr. 237 (B).
- Ecuador: Andes quitenses, Canelos; SPRUCE nr. 5258 (RB) — Balao, EGGERS nr. 14729 (B, W) — FRASER (B).
- Peru: secus rivulum Cachi-yacu, SPRUCE nr. 4659 (RB = *D. asterothrix* Ros.; a form with the underside more decidedly stellato-pubescent, else typical).
- Amazonas: Río Juruá, Miry, ULE nr. 5760 (B, C).
- Bahia: LUSCHNATH nr. 116 et 117 (B).

2. Eugoniopteris

C. Chr. Biolog. Arbejder tilegnede Eug. Warming 84. 1911.

249. *Dryopteris tristis* (Kze.) O. Ktze. Rev. 2: 814. 1891; C. Chr. Ind.

298. (pt.) — Fig. 41 c.

Syn. *Polypodium triste* Kunze, Linnaea 9: 47. 1834.

Aspidium triste Mett. Aspid. nr. 229. 1858.

Nephrodium triste Hk. sp. 4: 104. 1862; Hk. Bak. Syn. 266 (pt.).

Type from Peru; in sylvis primævis Huallagæ ad Mission Tocache, leg. POEPPIG 1959 (non vidi).

In Herb. Mett. (B) there is found a sketch of the original specimen and from this and the original diagnosis I have got a fair idea of this species, which has been said to have a wide distribution throughout the whole tropical America. — Rhizome obliquely erect or creeping with a few scales, which bear stellate hairs. Lamina with terminal pinna, dark-green, membranous (not coriaceous); rachis and stem pulverulent by stellate hairs; costæ and veins of underside with several patent, long, whitish hairs, which, however, are deciduous, and several specimens appear to be glabrous. Lower pinnæ shortly stalked and with a characteristic long cuneate entire base, the upper ones mostly truncate at the base. Pinnæ 15–20 cm long, 2¹/₂–3 cm broad, much acuminate, incised ¹/₂ to ¹/₃ of the way down into subfalcate, acute, close segments. Veins simple, 12–14 to a side, the lower 4 running out to the sinus. Sori small, medial; indusium very small, ciliated by long, simple hairs, soon falling and in several specimens not found. Sporangia glabrous.

D. tristis is distributed from Guiana to Peru, while it does not occur in Southern Brazil; the plants therefrom referred to *D. tristis* belong to *D. monosora* and *D. cuneata*. I have not seen the true form from Central-America, although it

is possible that some of the doubtful forms referred as varieties to *D. tetragona* really belong to *D. tristis*. For the present I prefer to refer to *D. tristis* the specimens only which have medial sori and lower pinnæ with a long cuneate base. They are the following:

Peru: Tarapoto, SPRUCE nr. 4091 (RB) — in valle fluv. Rio Húallaga, STÜBEL nr. 1090 (v. *glabrata* Hieron. Hedwigia 46: 324), 1090 a (B).

Ecuador: FRASER (B).

Colombia: Castañal, SONNTAG (B, C) — Magdalena, LINDIG nr. 377 b, 383 (B) — Ocaña, ENGEL nr. 256 (B); SCHLIM nr. 129 et 657 (B) — inter Honda et Bogotá, STÜBEL nr. 391 (B); LINDEN nr. 1010 (B) — Sta. Marta, H. H. SMITH nr. 2562 (C).

Panama: HILLEBRAND nr. 195 (B, C) — Bocas del Toro, HART nr. 21 a (W); MAXON nr. 4651, 4682 4705, 5756 (W).

Costa Rica: Rio Hondo, plains of Sta. Clara, 100 m, COOK and DOYLE nr. 561 (W).

Surinam: Paramaribo, KAPPLER nr. 1776 (B).

Brasilia: Pará, Rio Maracá (near Guiana), M. GUEDOS nr. 567 (C — bud on rachis) — in sylvis fl. Ma-
rañon, SPRUCE s. n. (RB).

250. *Dryopteris nicaraguensis* (Fourn.) C. Chr. Ind. 279. 1905. — Fig. 41 d.

Syn. *Phegopteris nicaraguensis* Fourn. Bull. Soc. Fr. 19: 252. 1872.

Type from Nicaragua: Chontales, leg. P. Lévy nr. 460 bis (Herb. COS-
SON, Paris!).

The type-specimen, with which agree a few other specimens, belongs to a species, which seems to be a very distinct one. It is marked by its large size: stipe up to 8 dcm long, lamina 5 dcm, pinnæ 20—24 cm long by $3\frac{1}{2}$ —4 cm broad at the middle, by the grey-green or yellowish green colour and firm, papyraceous texture of the lamina and by the prominent, stramineous costæ and costulæ. Veins 12—18-jugate, those of the three lower pairs connivent to sinus, below which they are separated by a hyaline membrane, folded in the dried specimens. Rachis very finely downy, especially upwards, like the costæ beneath, or nearly glabrous; surfaces otherwise glabrous, opaque. Pinnæ 8—10 to a side, at distances of 4—5 cm, the inferior ones shortly stalked, (terminal pinna similar in shape), incised about half-way to the costa into falcate, subacute, entire segments, 8 mm broad, the lower ones of the lower pinnæ gradually reduced, those of the basal or two lower pairs forming a sinuate wing to the costa. Sori small, inframedial, apparently exindusiate. Sporangia glabrous.

The main differences between the typical form and *D. tristis* are seen in the colour and texture of the lamina, in the base of the lower pinnæ and in the position of the sori. Unfortunately all these characters seem to be combined in different ways, and I have examined a number of specimens, which as well may be referred to *D. nicaraguensis* as to *D. tristis*. Other specimens, partly mentioned under *D. tetragona*, connect this species with *D. nicaraguensis*, and I have failed to find good distinctive characters, by which these intermediate forms can be referred to their proper species. To *D. tetragona* var. 3 and 5 I have referred the forms having

setose sporangia and thinner texture; the doubtful forms enumerated below agree with *D. nicaraguensis* in having glabrous sporangia and firmer texture.

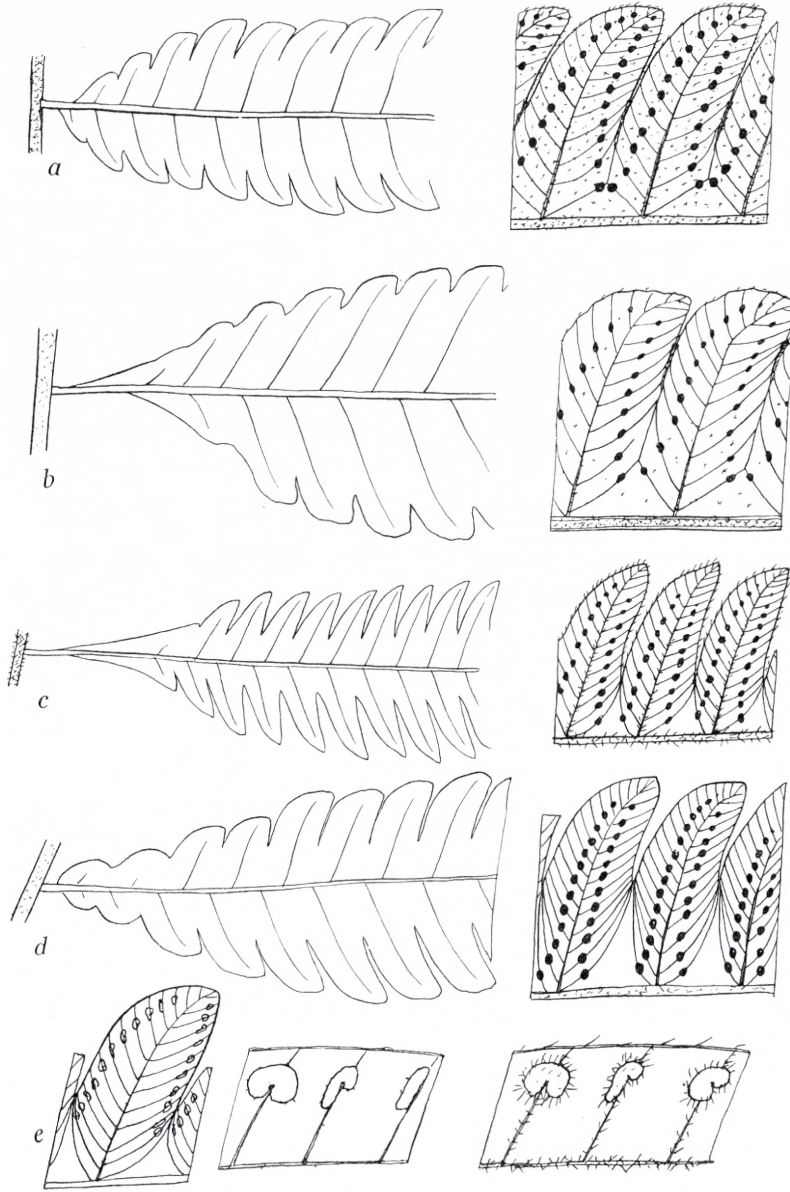


Fig. 41. Base of normal pinna ($\times 4/5$) and segments ($\times 1 1/2$) from the middle of a pinna of
a. D. megalodus (Schk.) Urb. — *b. D. leucophlebia* (Christ) C. Chr. — *c. D. tristis* (Kze.)
 O. Ktze. — *d. D. nicaraguensis* (Fourn.) C. Chr. — *e. Segment of D. Schaffneri* (Fée) ($\times 1 1/2$)
 from the type with a fragment showing three different indusia and a fragment of the
 hairy form ($\times 4$).

As typical I consider the following specimens:

Nicaragua: San Juan del Norte, CHARLES L. SMITH nr. 2098 (exactly typical).

Costa Rica: Puerto Limon. Hot de la Uvita, PITTIER nr. 12703 (C, W) — Suerre, Llanuras de Santa Clara, 300 m.; J. DONNELL SMITH nr. 6929 (W) — Rio Turrialba, DONNELL SMITH nr. 5093 (W).

Formæ:

Guatemala: HEYDE nr. 731 (W; segments acute).

Panama: Chagres, FENDLER nr. 403 (= HAYES nr. 36 (W, texture thinner, lobes narrower, base of lower pinnæ about as in *D. tristis*).

var. **minor**. Pinnæ ca. 15 cm long by 2 cm broad, dark-green. Veins about 10 to each side, the lower 4 connivent to sinus. — Resembles very much *D. tetragona* var. 2, from which it differs by its erect rhizome, which is up to 10 cm high.

Guatemala: Alta Verapaz, Vicinity of Secanquim, about 450 m., MAXON and HAY nr. 3196, 3217 (W).

251. **Dryopteris paucipinnata** (Donn. Smith) Maxon, Contr. U. S. Nat.

Herb. 13: 19. 1909.

Syn. *Nephrodium Fendleri* var. *paucipinnatum*, Donnell Smith, Bot. Gaz. 12: 134. 1887.

Type from Guatemala: Alta Verapaz, Petet, leg. H. von TÜRKHEIM, ed. DONN. SMITH nr. 667 and 767 (W, B). Other specimens from the same region were collected by DONNELL SMITH nr. 1556 (W) and v. TÜRKHEIM nr. II. 1690 (W).

Described in detail by MAXON (loc. cit.) and by him rightly separated from *D. Fendleri* as a distinct species. It is not at all allied to *D. Fendleri*, which belongs to a different group, but intermediate between *D. Schaffneri* or *D. tristis* and *D. obliterata*. It resembles *D. Schaffneri* in its submarginal sori and distinct, persistent indusia, *D. tristis* in the cuneate base of the pinnæ and in venation, *D. obliterata* in the general habit. It differs from all these species by its practically quite glabrous leaf, rigid to coriaceous texture and warted under-surface, from the two first-named species by its less incised pinnæ, which is pinnatifidly cut about $\frac{1}{3}$. From *D. Fendleri* it differs *inter alia* by its remote, alternate pinnæ with a cuneate base, venation and lack of aërophore and febrils beneath. Generally the lowermost 4—6 veins are connivent to sinus, but occasionally the lower pair are united. Sporangia glabrous.

252. **Dryopteris Fraseri** (Mett.) O. Ktze. Rev. 2: 812. 1891; C. Chr. Ind. 266.

Syn. *Aspidium Fraseri* Mett.; Kuhn, Linnaea 36: 109. 1869.

Nephrodium Fraseri Bak. Syn. 495. 1874.

Nephrodium brachyodon Sodiro, Cr. vasc. quit. 268. 1893!

Type from Ecuador, leg. FRASER 1859 (B!); identical specimens from the same country were collected by STÜBEL nr. 762 (B) and SODIRO (C).

A large species, very characteristic in habit but otherwise closely allied to the other large species of this group. Pinnæ at distances of up to 10 cm., opposite,

dark-green, membranous, 15–20 cm long, 4–5 cm broad, sessile or very shortly stalked, lower ones much reflexed, incised scarcely halfway to the costa into a little falcate, obtuse lobes. Terminal pinna rather distinct with a bud at base. Rachis slender, sparsely soft-hairy, lamina otherwise quite glabrous, but the surfaces often minutely warted. Veins 15–16-jugate, the lower 3–4 pairs connivent to a cartilagineous membrane below the sinus; the basal posterior vein raises always from the costa. Sori a little inframedial, indusium small, deciduous, ciliate. Sporangia glabrous.

253. *Dryopteris cuneata* n. sp. — Fig. 42.

Type from Brazil: São Paulo, Santos, H. Mosén nr. 3545 (Rg fol. fert.; S fol. ster.).

Rhizomate repente, dense radicante, apice squamis rufis, latis pilis furcatis sparse ciliatis, dense onusto. Stipite $6\frac{1}{2}$ dem longo, angulato, stramineo, glabro. Lamina ovata, ca. 4 dem longa, pinnata cum impari, pure viridi (infra pallidior), herbacea vel submembranacea, glaberrima. Pinnis lateralibus 7-jugis, inferioribus oppositis, 4 cm inter se remotis, breviter petiolulatis, superioribus alternis, supremis sessilibus, mediis 20 cm longis, medio 3 cm latis, acuminatis, basi cuneata subintegra, ad medium pinnatifidis. Laciniis approximatis, subfalcatis, 5 mm latis, obtusis vel subacutis. Venis simplicibus, 9–11-jugis, inferioribus 4–5 ad sinum conniventibus. Soris inframedialibus, parvis, indusiis persistentibus rufis sparse ciliatis tectis. Sporangiiis glabris.

This new species seems different from all other Brazilian species. It is nearest *D. monosora*, which it resembles in shape of pinnae and venation, but it is entirely glabrous and without scales on rachis, has a distinct terminal pinna, the sori are inframedial and the stipe much longer. In general habit it resembles *D. paucipinnata*, but it is much more thin-leaved and the sori are inframedial.

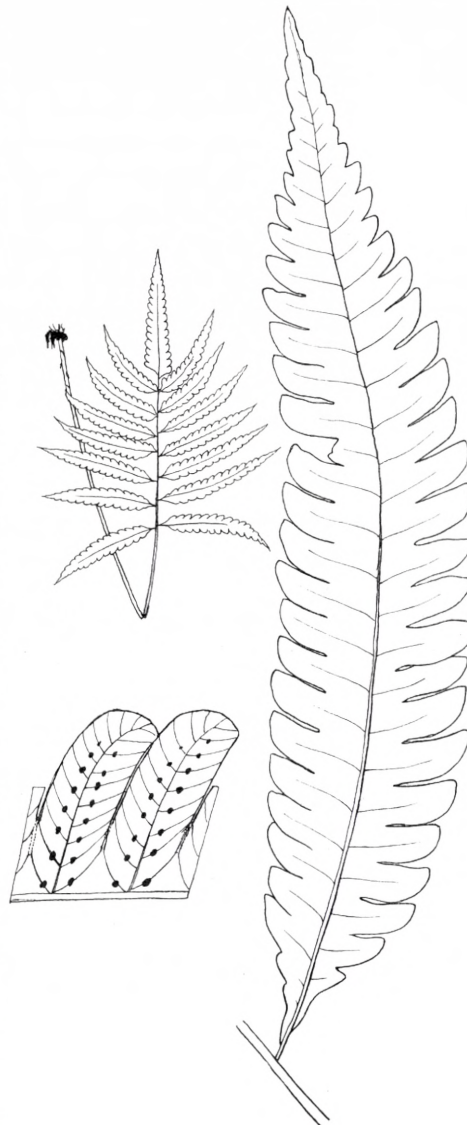


Fig. 42. *D. cuneata* n. sp. Pinna $\times \frac{4}{5}$, segments $\times 1\frac{1}{2}$ and an entire leaf, showing its habit, much reduced.

254. *Dryopteris Schaffneri* (Fée) C. Chr. Ind. 291. 1905. — Fig 41 e.

Syn. *Nephrodium Schaffneri* Fée, 8 mém. 108, 1857; 10 mém. 44. tab. 43.

Aspidium varians Mett.; Kuhn, *Linnaea* 36: 114. 1869!

Aspidium imbricatum Fourn. Mex. pl. 1: 96. 1872!

Dryopteris imbricata C. Chr. Ind. 271. 1905.

Type from Mexico: Mirador, leg. SCHAFFNER nr. 244 (non vidi).

A distinct species, in habit not unlike *D. tristis*, but well-marked by its peculiar indusia; in other respects it is very variable. Rhizome creeping. Lamina with 3—6 pairs of lateral pinnæ and a similar terminal one. Pinnæ 15—25 cm long, 3—4 cm broad, stalked, incised about halfway to the midrib into falcate, acute or obtuse segments. Pubescence variable; some specimens are practically quite glabrous (= var. *glabrescens* Fourn. l. c.); others have long, whitish, patent hairs on costæ and veins beneath; rachis shortly pulverulent; under-surface verrucose. Venation variable; veins about 15 to a side, simple or, not rarely furcate, the lowest 3—6 connivent to sinus, those of the basal pair often truly anastomosing. Sori nearest the margin, furnished with a persistent, flat, ciliate, variable indusium; in same pinnæ one can find as well reniform as athyroid or even asplenioid indusia.

I have no doubt that *A. varians* Mett. = *A. imbricatum* Fourn. (not *Polypodium imbricatum* Liebm., which is *D. tetragona*) is identical with *N. Schaffneri* Fée; this is the glabrescent form, while *A. varians* is hairy as described above. — The species is apparently a rare one and confined to the humid forests of south-eastern Mexico. I have seen the following specimens:

Mexico: San Luis Potosi, VIRLET nr. 82 (B, Herb. Mus. Paris) — Misantla, L. HAHN nr. 623 (B, Herb. Mus. Paris) — Córdoba, KERBER nr. 86 a (B) — Mirador, SCHAFFNER, MÜLLER, SARTORIUS (B) — Vicinity of Gómez, Fárias, Tamaulipas, EDW. PALMER nr. 298 (W).

255. *Dryopteris vivipara* (Raddi) C. Chr. Index 300. 1905 — Fig. 43 c.

Syn. *Polypodium viviparum* Raddi, Pl. bras. 1: 22 tab. 32. 1825.

Polypodium diversifolium Sw. Vet. Akad. Handl. 1817: 60 (non alior.).

Polypodium proliferum Klf. Enum. 107. 1824.

(For other synonyms see Index Filicum).

Type from Southern Brazil. I have seen the original specimens of *P. diversifolium* Sw. from Minas Geraes, leg. FREYREIS (S), which no doubt is the same as *P. viviparum* Raddi.

One of the most distinct species of the whole group, easily distinguished from related species by its glabrous frond, proportionally small (8—10 cm × 1—2 cm) pinnæ, which are nearly entire or very shallowly serrulate or crenate, and by the cartilagineous, often thickened margins. The short-creeping or decumbent rhizome is clothed with stellato-pilose scales; rachis often gemmiferous. Pinnæ alternate, the lower ones short-stalked, rounded or short-cuneate at base, not warted beneath. Veins 3—6-jugate, the two lower pairs generally united, the lowermost pair, which

always spring out from the costule 1 mm above the costa (fig. 43 c), occasionally meniscioid. Sori about medial, the lowermost ones still often near the point, where the basal veins meet and generally 2—3 mm remote from the costa, thus leaving a disc along the middle of the pinna free of sori. Indusium not seen; sporangia glabrous.

D. vivipara varies mainly in texture and shape of pinnæ. Some forms are thinly membranaceous, others coriaceous. From the type I cannot distinguish certainly

Aspidium macropus Mett. Fil. Lechl. 2: 20. 1859, based on CLAUSSEN nr. 112 (B). METTENIUS found it different from *D. vivipara* by its having a small indusium, which I have not found. It is a large form with pinnæ up to 15 cm long; the rhizome seems to be erect and is densely clothed with red-brown scales. To me it is only a large form of typical *D. vivipara*. A more distinct variety is

var. **platypes** (Fée).

Syn. *Goniopteris platypes* Fée, Cr. vasc. Br. 1: 106 tab. 33 "fig. 3", left-hand figure. 1869.

Differs from the type by its glossy, dark-green papyraceous leaf and large size. Pinnæ up to 20 cm long, 3—3½ cm broad, cuneate at base, margins serrulate. Veins about 6, much upcurved, the anterior basal one often springing out from the costa. — The type specimen of this variety (GLAZIOU nr. 2402), which BAKER most remarkably referred to *D. tetragona* looks a distinct species, but it is connected with the type by numerous intermediate forms.

D. vivipara is a common species in Southern Brazil and it is one of the very few species, which occur in almost identical forms in the Andes. I name some collector-numbers:

Brazil: Rio, GLAZIOU nr. 409 (H), 7321 (B); SELLOW nr. 198 (B); BURCHELL nr. 936, 968 (B); CLAUSSEN nr. 2112 (B); MOSÉN nr. 85 pt. (B, H, Rg), 2682 (Rg); REGNELL nr. 260 (Rg) — Sta. Catharina, Blumenau, H. SCHENK nr. 171 (C) — Paraná, Villa Nova, ANNIES, Rosenst. Fil. Austr. Bras. nr. 104 (Rg, W).

Columbia: Cundinamarca, WERCKLÉ 1906 (C); KARSTEN nr. 60 (B); LINDIG nr. 193 (B).

Costa Rica: Rio Surubres, 400 m., A. et C. BRADE nr. 420 (R).

var. **platypes** (Fée).

Brazil: Rio, GLAZIOU nr. 2402 (Herb. COSSON, Paris, H); MOSÉN nr. 85 part. (H) — JELINEK nr. 140 part. (B).

256. *Dryopteris straminea* (Bak.) C. Chr. Index 294. 1905. — Fig. 43 b.

Syn. *Polypodium salicifolium* Hook. sp. 4: 242. 1862.

Polypodium stramineum Bak. Syn. 316. 1867.

Type from Venezuela: Tovar, leg. FENDLER nr. 474 (Kew!).

Nearly exactly *D. vivipara* in size, texture, entirely glabrous frond, the cartilaginous margins and gemmiferous rachis, but veins all free, about 4 to a side, the two basal ones terminating in the leaf-tissue and the posterior one springing out from the costa. Pinnæ crenate or slightly lobed. It is not unlikely a variety of *D. vivipara*.

257. *Dryopteris Goeldii* n. sp. — Fig. 43 a.

Type from Brazil: Linkes Ufer d. Parahyba, leg. GOELDI 1887 nr. 3 (C).

Rhizomate oblique-erecto, squamis paucis stellato-ciliatis instructo. Stipitibus ad 30 cm longis, glabris. Lamina ovata, 30—40 cm longa, 20 cm lata, pure viridi, firmo-herbacea, rachi minute stellato-puberula excepta glaberrima, ad insertionem pinnae lateralis supremæ gemmulifera, pinnata cum pinna terminali subhastata.

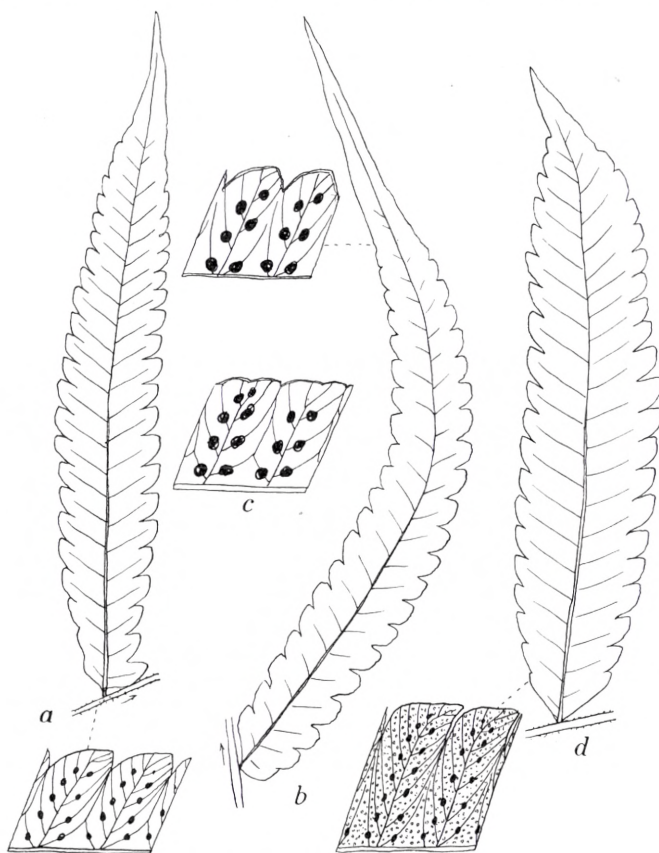


Fig. 43. Pinnæ ($\times \frac{4}{5}$) and segments ($\times 1\frac{1}{2}$) of a. *D. Goeldii* n. sp. — b. *D. straminea* (Bak.) C. Chr. and d. *D. juruensis* n. sp. c. Segment of *D. vivipara* (Raddi) C. Chr. $\times 1\frac{1}{2}$.

Still its nearest ally is *D. straminea* and it may be the same species and like it a variety of *D. vivipara*; it differs by its united basal veins and more numerous veins, more deeply cut pinnæ of thinner texture and margins not so thickened.

258. *Dryopteris juruensis* n. sp. — Fig. 43 d.

Type from Amazonas: Auf Erdboden, im Walde bei Bom Fim, Rio Juruá, Oct. 1900, leg. E. ULE, Herb. Brazil. Amazonas expedition nr. 5325 (B!; C) — SPRUCE nr. 3905, ad fluv. Marañon (B) is exactly the same.

Pinnis 6—7-jugis, inter se 3 cm remotis, breviter petiolulatis, lanceolatis, 10 cm longis, $1\frac{1}{2}$ cm latis, acuminatis, ad basin parum attenuatis, saepe auriculatis, ad tertiam partem incis. Lobis obliquis, acutis vel obtusiusculis. Venis 8—9-jugis, basalibus duabus semper anastomosantibus, sequentibus duabus ad sinum conniventibus. Soris fere medialibus vel potius inframedialibus. Indusiis minimis, pilis bi-trifurcatis ciliatis, mox evanidis. Sporangis glabris.

A critical species, in certain characters resembling several other species. It differs from *D. tetragona* by its less cut pinnæ and glabrous costæ, from *D. juruensis* by more pinnæ and not warted surfaces, from *D. pyramidata* by distant pinnæ, terminal pinna, glabrous costæ and venation, from *D. anoptera*, which it resembles in venation, by glabrous sporangia and absence of scales, from *D. vivipara* by thinner texture and distinctly lobed pinnæ, from *D. scabra* by venation, glabrous frond etc.

Rhizomate oblique-erecto, squamis stellato-pilosis sparse onusto. Stipitibus subfasciculatis, foliorum sterilium 10—20 cm, fertilium 30—40 cm longis, angularibus, sparse et decidue squamosis, glabris. Lamina ovata, 15—18 cm longa, 12—15 cm lata, griseo-viridi, membranacea, rachi minute stellato-puberula costis pinnarum subtus sparse et microscopice hirtis exceptis glaberrima, sed paginis densissime verrucosis, ad insertionem pinnæ lateralis supremæ gemma magna squamosa bulbifera, pinnata cum impari. Pinnis lateralibus 2—4-jugis, alternis, infimis breviter petiolulatis, supremis sessilibus, lanceolato-ellipticis, 12 cm longis, 2—2¹/₂ cm latis, ad basin breviter contractis, versus apicem acuminatis, grosse serrulatis vel lobulatis. Lobis approximatis, subfalcatis, obtusis vel antice acutis, 5—6 mm longis, 4—5 mm latis. Venis simplicibus, valde ascendentibus, 8—9-jugis, inferioribus 3—4 ad sinum conniventibus, omnibus liberis et saepe interruptis, infimis interdum anastomosantibus meniscioideis. Soris parum inframedialibus, indusiis minimis, ciliatis, raro repertis. Sporangii glabris.

This new species agrees with *D. obliterata* in shape and cutting of the pinnæ and partly also in venation, but it differs considerably from that species, its nearest relative, by the few pinnæ, gemmiferous rachis, thinner texture, both surfaces being densely warted by small raised points, and by its variable venation. Most often the veins are all free, but one can in the same pinna find all intermediate states of venation, from all veins being free to 2—3 pairs anastomosing and then the lowermost pair is often meniscoid. The anterior basal vein springs constantly out from the costa, which is not the case in *D. obliterata*. In all specimens seen the fertile leaves have a longer stipe than the sterile ones.

259. *Dryopteris obliterata* (Sw.) C. Chr. Ind. 280. 1905.

Syn. *Polypodium obliteratum* Sw. Prodr. 132. 1788; Fl. Ind. occ. 1660; Bak. in Hk. Icon. plant. tab. 1669. Jenm. Bull. Dept. Jam. n. s. 4: 132. 1897.

Phegopteris obliterata Mett. Pheg. nr. 46. 1858.

Polypodium faucium Liebm. Mex. Bregn. 57 (Vid. Selsk. Skr. V. 1: 209). 1849.

Type from Jamaica, leg. SWARTZ (S!).

Rhizome shortly creeping with a few densely stellato-pilose scales. Stipes subdistant, 4—5 dcm long, quadrangular, greyish-stramineous, glabrous. Lamina with 6—10 pairs of shortly stalked, alternate, lateral pinnæ and a similar but often larger terminal pinna, firmly membranous or papyraceous, sometimes nearly coriaceous, generally greyish green, microscopically puberulous on rachis and costæ beneath, otherwise glabrous; hairs of rachis stellate. Pinnæ 12—20 cm long by 2—3 cm broad, acuminate, shortly attenuate towards the base, serrate or shallowly lobed. Teeth oblique, acute, not much longer than broad. Veins 6—8-jugate, the lower two pairs generally thinly anastomosing and sending a branch to the narrow membrane, to which the next 2—3 pairs are connivent; in Central-American specimens the lowest or sometimes the two lower pair of veins are meniscoid. Sori in two convergent rows, the lower ones being about medial, the upper ones gradually approaching the

costule. Sporangia with a few simple, deciduous setæ or in some specimens glabrous. "In the early stage of growth trace of a rudimentary involucre is observable, which however soon disappears" (JENMAN loc. cit.). I have not found indusia.

This species, of which the plate of Hk. Icon. t. 1669 gives a fair illustration, can be considered the type of a small group including the species nr. 257—261 of this monograph, which connect *D. tetragona* with *D. Poiteana*. From *D. tetragona* they differ by venation and less cut pinnæ, from *D. Poiteana* by few or no meniscioid veins. The Central-American specimens of *D. obliterata* approach *D. Poiteana* more than the West-Indian ones, and they also resemble *D. paucipinnata*, from which they differ by position of sori, venation, texture and generally exindusiate sori.

D. obliterata is confined to Jamaica, Cuba, Mexico and Northern Central-America. I have seen the following specimens:

- Jamaica: SWARTZ (H, S); MAXON nr. 831, 1799 (= UNDERWOOD nr. 2772), 1846, 1924, 2876 (W), 2375 (C, W); UNDERWOOD nr. 117 (W); CLUTE nr. 246 (W); HART nr. 336 (W); O. HANSEN (CC, H).
 Cuba: WRIGHT nr. 1010 (C, CC, S, W) — Santiago, POLLARD and E. & W. PALMER nr. 96 (W) — Pinar del Rio, PALMER and RILEY nr. 72 (C, H, W), 251 (W) — Santa Catalina, CALDWELL and BAKER nr. 7028 (W) — Isla de Pinos: A. H. CURTISS nr. 345 (W); A. A. TAYLOR nr. 9 (W); PALMER and RILEY nr. 1040 (W).
 Mexico: Barranca de Jovo, LIEBMANN (H B, *P. faucium* Liebm.) — SCHAFFNER (B) — Coatzacoalcos, isthmus of Tehuantepec, CHAS. L. SMITH nr. 2052 (W).
 Guatemala: Puerto Barrios, MAXON and HEY nr. 3059 (C, W) — Rio Dulce, DONNELL SMITH nr. 1559 (W) — Livingston, KELLERMANN nr. 4856 (W) — Puerto Barrios, B. L. ROBINSON nr. 472 (W) — near Cacao, H. S. BARBER nr. 186 (W).
 Honduras: Bonacca, GODMAN and SALVIN (B) — San Pedro Sula, C. THIEME, ed. DONN. SMITH nr. 5685 (W); 5693 part. (B, not W).

260. *Dryopteris nigrescentia* (Jenman) C. Chr. Ind. 279. 1905 — Fig. 44.

Syn. *Polypodium nigrescentium* Jenman, Gard. Chron. III. 17: 100. 1895; Bull. Dept. Jam. n. s. 4: 132. 1897.

Type from Jamaica, leg. JENMAN (W!).

A doubtful species, of which I have seen 5 leaves only. It may be an abnormal, local form of *D. obliterata*, which it resembles in the essential characters. It differs by the stouter rhizome, smaller leaves (10 cm long and broad at base), dark-green colour, wrinkled, serrulate, opposite and sessile pinnæ, and shortened often rudimentary terminal pinna. Veins 4—5 to each side, the lowest 2—3 pairs anastomosing. Sporangia glabrous. Rachis more conspicuously stellato-puberulous.

261. *Dryopteris Rolandii* n. sp. — Fig. 45.

Ecuador: Rio de Ventanas prope Guayaquil, leg. SPRUCE nr. 5718 (type in RB).

Rhizomate? Stipitibus validis, brunneo-stramineis, supra trisulcatis, 6¹/₂ dem longis, ubique dense stellatim puberulis ad insertionem sparse squamosis; pilis brevissimis 3—6 furcatis, squamis angustis pilis stellatis dense instructis. Lamina 4 dem longa, pinnata cum impari, herbacea, pure viridi; rachi tenui stellatim pilosa; pinnis 7-jugis, suboppositis vel superioribus alternis, sessilibus, inter se 5—6 cm

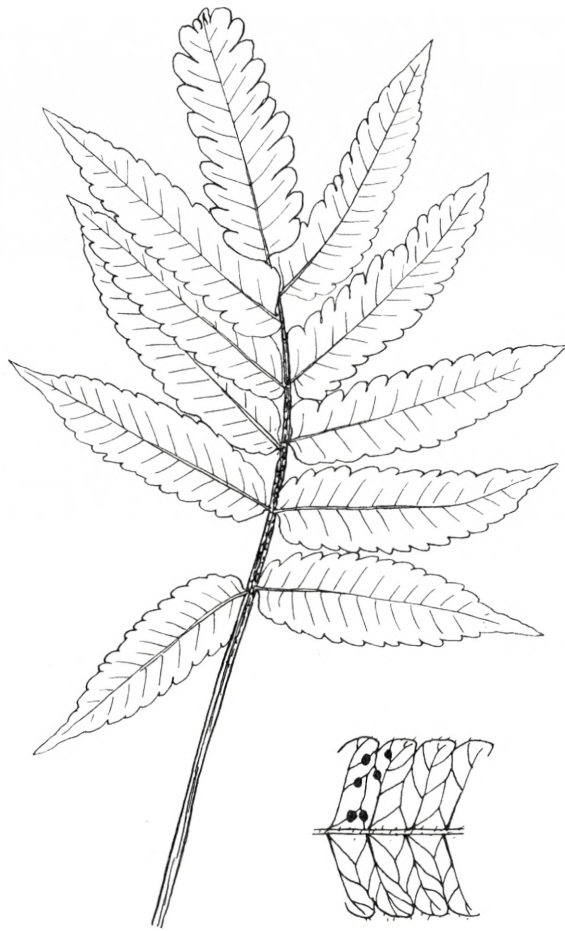


Fig. 44. Entire leaf of *D. nigrescentia* (Jenm.)
C Chr., $\times \frac{4}{5}$ and fragment $\times 1\frac{1}{2}$.

remotis, lanceolatis, 15 cm longis medio 3 cm latis, inferioribus e medio utrinque attenuatis, superioribus basi subtruncatis, breve acuminatis, supra ad costam pilis antrorsis simplicibus vel furcatis setosis, ad venas setis paucis instructis, inter venas glabris, subtus ubique — præsertim ad costam — pilis brevibus mollibus raro furcatis sparse pubescentibus, marginibus ciliatis, grosse lobatis. Lobis obliquis, approximatis, obtusis, leviter crenatis, mediis $\frac{1}{2}$ cm longis et latis, basali superiore rachin tangente, inferiore a rachi 4—5 mm remoto. Venis simplicibus, 9—10 jugis, inferioribus 2—3 jugis anastomosantibus, basalibus meniscioides. Soris luteis, medialibus, exindusiatis, sporangiis pilis 5—6 simplicibus acutis setosis.

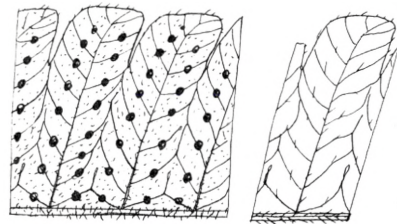
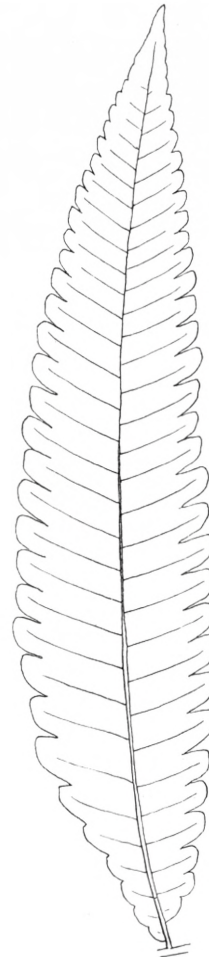


Fig. 45. *D. Rolandii* n. sp. — Pinna
 $\times \frac{4}{5}$ and fragments seen from both
surfaces $\times 1\frac{1}{2}$.

Closely allied to *D. tetragona*, *D. megalodus* and *D. Poiteana*; it resembles *D. megalodus* in venation and cutting but differs by its densely setose capsules and lack of the adpressed stellate hairs on the leaf-tissue of the under-surfaces; from *D. Poiteana* it differs by the dense stellate pubescence of stipe and rachis, the deeper incised pinnæ and fewer anastomosing veins; as a rule only the basal pair of veins are united into a free excurrent vein. From *D. juruensis* it differs by its not-granulose surfaces and the not-bulbiferous rachis.

262. *Dryopteris tetragona* (Sw.) Urban, Symb. Ant. 4: 20. 1903; C. Chr. Ind. 297.

Syn. *Polypodium tetragonum* Sw. Prod. 132. 1788; Schkuhr, Kr. Gew. 1: tab. 18.

? *Polypodium androgynum* Poir. Enc. 5: 535. 1804.

Polypodium subtetragonum Link, Hort. Berol. 2: 105. 1833!

Polypodium imbricatum Liebm. Mex. Bregn. 58 (Vid. Selsk. Skr. V. 1: 210). 1849!

(For other synonyms see Index Fil.).

Type from Jamaica leg. SWARTZ (S!). As SWARTZ has named different forms *D. tetragonum* I consider that form typical, which is figured by SCHKUHR and which agrees perfectly with the original diagnosis.

D. tetragona has been considered a very variable species of a wide distribution, and this is to a certain degree true, but I have found that about half the number of the hundreds of specimens named *tetragona* and examined by me belong to more or less allied species, which it is not difficult to distinguish from *D. tetragona*. The common West-Indian typical form of this shows the following specific characters:

Rhizome shortly creeping or obliquely erect with brown scales, which are covered with stellate hairs. Stipes fasciculated like the rachis stramineous, quadrangular, slightly and very shortly hairy by stellate hairs. Leaves somewhat dimorphous, the pinnæ of the fertile leaves being narrower (2 cm br.) than those of the sterile ones (2½ cm br.). Lamina ovate with 6–12 pairs (generally 8) of lateral pinnæ and a similar terminal one. Pinnæ opposite or nearly so, short-stalked, oblong, acuminate, the lower ones narrowed towards the base, about 10 cm long by 2–2½ cm broad, incised ½ or ⅔ of the way down into close, acute, entire segments, herbaceous, dark-green, the under-surface generally nitid, glabrous on both surfaces, excepting the costæ (which are flat with two low furrows) and costulæ beneath, which are slightly hairy by spreading, simple, acute hairs, ciliate at the margins. Veins simple, 8–10-jugate, the basal pair united and sending a branch to the sinus, the two next free and reaching the margin immediately above the sinus. Sori inframedial, exindusiate; sporangia setose.

The form here described is very common in the West-Indies and there fairly constant; nearly identical forms are found on the continent from Mexico to Ecuador; the specimens herefrom have, however, generally a more dull under-surface. In the following I enumerate the islands and countries, from which I have seen specimens and add some of the more important collector-numbers.

- West-Indian Islands: Trinidad, CRÜGER (B), BROADWAY nr. 3294 (B) — Grenada, EGGERS nr. 6331 (C) — St. Vincent, EGGERS nr. 6540 (W) — Barbados, EGGERS nr. 7113 (C), 7194 (C, RB) — Martinique, SIEBER, Fl. Mart. nr. 240 (B), Père Duss nr. 1567 (RB, W), 1580 (W) 37 (C "arboricole") — Dominica, F. E. LLOYD nr. 538, 686 (W) — Guadeloupe, Père Duss nr. 4032, 4113 (W) — Montserrat (H) — St. Kitts (S) — Antigua (B) — Saba (S) — St. Croix (H, W) — St. Thomas, EGGERS nr. 85 (B, C, H, W) — San Jan, EGGERS nr. 3056 (H) — Porto Rico, SINTENIS nr. 883 (S, W), 2498 (W), 2164 (C), GOLL nr. 935 (W), UNDERWOOD and GRIGGS nr. 274 (W), Mr. and Mrs. HELLER nr. 613 (W) — Haïti, NASH and TAYLOR nr. 1230 (W), Dr. WEINLAND nr. 9 (B) — Jamaica, MAXON nr. 826, 2184, 2565 (W), UNDERWOOD nr. 2911 (W), HART nr. 330 (W) — Cuba: Prov. Oriente, WRIGHT nr. 817 (S), MAXON nr. 4228 (W), LINDEN nr. 2191 (B); Prov. Sta. Clara, PRINGLE nr. 129 (W); Prov. Pinar del Rio, PALMER and RILEY nr. 291 (H, W), van HERMANN nr. 2069 (W); Prov. Habana, van HERMANN nr. 5053 (W) — Isle of Pines, PALMER and RILEY nr. 865 (W).
- Florida: Marion Co., Miss REYNOLDS (W).
- Mexico: PALMER nr. 1129 (W) — Laguna del Negro, ROVIROSA nr. 566 (W) — S. Luis Potosi: Tamasopo, PRINGLE nr. 3959 (B, C, S, W) — Vera Cruz: Papantla, LIEBMANN (H = *Pol. imbricatum* Liebm.; this was by FOURNIER identified with *Asp. varians* Mett., which, however, is the same as *D. Schaffneri*; LIEBMANN's type specimen consists of a single sterile leaf and belongs to typical *tetragona*. *P. tetragonum* Liebm. is *D. tetragona* var. 2 (see below).
- Guatemala: Escuintla, DONNELL SMITH nr. 2439, 2440 (W) — Los Amates, C. et E. SELER nr. 3360, 3361 (B) — Mazatenango, MAXON and HAY nr. 3629 (W).
- Honduras: San Pedro Sula, C. THIEME ed. J. D. S. nr. 5693 part. (W).
- Nicaragua: Ceria Granada, P. LÉVY nr. 55 (Brux.).
- Costa Rica: Port Limon, COOK and DOYLE nr. 435 (W).
- Panama: Chiriqui, HART (W).
- Colombia: Magdalena, LINDIG nr. 377 (B) — Sta. Marta, H. H. SMITH nr. 995 (C) — Galipan, MORITZ nr. 292 (B).
- Venezuela: MORITZ nr. 205 (RB), 210 (B) — Pto. Cabello, KARSTEN nr. 71 pt. (B) — La Guayra, E. OTTO nr. 424 pt. (B) — San Julian, LYON (W).
- Surinam: HOSTMANN & KAPPLER nr. 1775 (B).
- Ecuador: El Recreo, EGGERS nr. 14900 (B).

var. *guadalupensis* (Fée).

Syn. *Goniopteris guadalupensis* Fée, 11 mém. 64 tab. 17 fig. 2. 1866.

Like typical *tetragona* in colour and pubescence but larger: pinnæ 3—3¹/₂ cm broad, incised only ¹/₂ of the way down, and 2—3 pairs of veins anastomosing. Not unlike *D. megalodus* but without stellate hairs beneath.

Guadeloupe: L'HERMINIER nr. 127 (B, C), Père Duss nr. 233 (C).

Grenada: RAWSON W. RAWSON (B).

Trinidad: BROADWAY nr. 3293 (B).

Jamaica: HART (W).

In Central-America a long series of forms is to be found, which I dare not refer to any of the accepted species. As most of these forms are known only from a single or a few specimens, which rarely are fully identical, I prefer to place them under *D. tetragona* as *formæ dubiæ* instead of describing them as new species. In these forms the most important characters of the species *tetragona*, *obliterata*, *nica-raguensis* and *tristis* are combined. A special mark of the majority of these forms is that the basal veins do not anastomose but are connivent to sinus, although the leaves in other respects very much resemble *D. tetragona*, and it is possible that

this species varies in venation, still it is remarkable that the West-Indian common form always has the basal pair of veins anastomosing. These free-veined Central-American forms were mentioned before, f. inst. by FOURNIER (Bull. Soc. Fr. 19: 253), who only with doubt referred them to *D. tetragona*. I am inclined to consider var. 2, 5 and 6 distinct species, and var. 1 a variety of *D. tetragona*.

var. 1. Resembles in size and colour the common *tetragona*, but the basal veins connivent to sinus; 12—14 veins; sori subcostular; sporangia glabrous.

Guatemala: San Felipe, Depart. Retalhuleu, 2050', DONNELL SMITH nr. 2733 (W).

var. 2. Size of *D. tetragona*, colour intense, green, opaque not shining; lower veins occasionally anastomosing but more often the 2—3 lower ones are connivent to sinus. Sori small, dark, almost medial; sporangia glabrous.

This is *Polyp. tetragonum* Liebm. Mex. Bregm. 211, and it is probable that LIEBMANN was right in considering it specifically distinct from *D. tetragona* = *P. imbricatum* Liebm.

Mexico: Vera Cruz, Buenaventura, H. ROSS nr. 1073 (CC) — La Junta, H. ROSS nr. 1113 (CC), ROVIROSA (W), LIEBMANN (H).

Similar forms are

Guatemala: San Felipe, Dep. Retalhuleu, coffee-plantation, MAXON and HAY nr. 3513 (W); Rhizome long horizontally creeping; sori costular.

Honduras: San Pedro Sula, C. THIEME ed. J. D. S. nr. 5694 (C); Pinnæ narrower and very remote; sporangia setose.

var. 3. Very like var. 2, but segments falcate and veins about 15; lower pinnæ with a cuneate entire base and all long acuminate. Sporangia setose; rhizome erect. Perhaps a variety of *D. nicaraguensis*.

Guatemala: Cubilquitz, 350 m, v. TUERCKHEIM ed. J. D. S. nr. 8646 (C, W) — Volcan Tecuamburro, HEYDE et LUX ed J. D. S. nr. 4685 (B, C, W) — San Felipe, DONNELL SMITH nr. 2733 (W) — near the Finca Sepacuite, COOK and GRIGGS nr. 372 (W).

var. 4. Intermediate between *D. tetragona* and *D. obliterated*. Pinnæ incised $\frac{1}{2}$, basal pair of veins anastomosing with a short meniscioid branch; above them 2—4 pairs of veins connivent to sinus; sori medial; sporangia densely setose.

Guatemala: Gualan, Depart. Zacapa, W. A. KELLERMANN nr. 4869 (W).

var. 5. Here I place a number of rather different forms, which are intermediate between *D. tetragona* and *D. nicaraguensis*. They resemble the former in size, the setose sporangia, and the truncate or slightly narrowed base of the pinnæ, and the latter in venation, the light colour and the semiterete costa of the pinnæ beneath. As a rule the pinnæ are incised $\frac{1}{3}$ — $\frac{1}{2}$ with 6—8 veins connivent to sinus. Sori inframedial, small, yellowish. Texture firmer than *D. tetragona*, thinner than *D. nicaraguensis*.

Costa Rica: Puerto Viejo, PITTIER nr. 7489 (B, W), 6937 (C, W) — Guacimo, Llanos de Sta. Clara, TONDUZ nr. 14578 (W) — forêts de Bornea, PITTIER nr. 4824 (W) — Suerre, Llanuras de Sta. Clara, DONNELL SMITH nr. 6897 (W) — forêts de Tuis, TONDUZ nr. 11312 (C) — Jiménez, ALFARO nr. 16479 (C).

Panama: Bocas del Toro, J. HART nr. 55 (W).

var. 6. Not unlike *D. nicaraguensis* but texture thinner and segments less falcate, acute; lower pinnæ with a long cuneate, entire base as in *D. tristis*. Rachis and costæ beneath very shortly pulverulent by stellate hairs. Sori subcostular, setose by many multibranched hairs. Probably a new species, but the specimens are too fragmentary for a description.

Honduras: San Pedro Sula, 1500', C. THIEME ed. J. D. S. nr. 5693 part. (C, W).

In Brazil several forms occur, which most authors have referred to *D. tetragona*, but which are positively specifically different; see *D. scabra*, *D. incompleta* and others.

Nephrodium aureo-viridum Jenman, W. Ind. and Guiana Ferns 238. 1908 is, as far as I can judge from a photograph and a fragment of JENMAN'S type-specimen (from British Guiana), received from Miss SLOSSON, not safely distinguishable from *D. tetragona*. Its sori are said to be indusiate when young.

263. *Dryopteris megalodus* (Schkuhr) Urban, Symb. Ant. 4: 21. 1903;
C. Chr. Ind. 277. — Fig. 41 a.

Syn. *Polypodium megalodus* Schkuhr, Kr. Gew. 1: 24 tab. 19 b. 1806.

Goniopteris quadrangularis Fée, 11 mém. 63 tab. 16 fig. 3. 1866.

(For other synonyms see Ind. Fil.).

SCHKUHR characterized this species by pointing out the presence of stellate hairs on the underside; as the species here named *D. megalodus* differs from other species of *Eugoniopteris*, *D. leucophlebia* excepted, by that character, and as SCHKUHR'S plate very well illustrates our species, I have no doubt that I understand the species of SCHKUHR rightly. As suggested in Index Fil. *Polypodium pennatum* Poir. Enc. 5: 535. 1904 is probably the same species and, if so, POIRET'S name has priority. I have seen the original specimen of it in Herb. LAMARCK (Mus. Paris) but unfortunately my notes do not permit me to identify it with *D. megalodus* with absolute certainty; it may be also *D. nephrodioides*. I prefer, therefore, to name the species by that name, under which it has been known for a century.

D. megalodus is not closely allied to *D. tetragona*, with which BAKER united it. It resembles that species mostly by its lower pair of veins anastomosing under a broad angle. From *D. glandulosa*, with which it has very often been confounded, it differs by its stellate hairs, venation and absence of aërophores.

The short-creeping rhizome is sparsely clothed with castaneous, small scales, which are stellato-pubescent throughout. Stipe and rachis often quadrangular and slightly puberulous by very small and soon deciduous stellate hairs. Pinnæ few, seldom 10 to a side, distinctly stalked, 15—25 cm long, 3—4 broad, herbaceous, dark-green, incised about $\frac{1}{3}$ to the costa into falcate, obtuse, faintly crenate, close lobes, glabrous above, costæ and veins beneath minutely puberulous by stellate hairs, leaf-tissue of the underside with microscopic stellate hairs or glabrous. Venation somewhat variable; veins 12—16 to a side, simple, the basal pair always anastomosing and sending a branch to a cartilaginous membrane, which extends from the sinus

one third of the way to the costa; along the edges of this membrane run the following 2—3 veins from the same costule to sinus; as a rule they run closely side by side, but sometimes they are found to be united. This being the case the venation is very similar to that of *D. glandulosa*. Sori medial, small, exindusiate. Sporangia glabrous; receptacle with stellate hairs.

The typical form of *D. megalodus* is probably common in most of the Lesser Antilles. In Central-America a larger form occurs, which can not always easily be distinguished from *D. nephrodioides* var. *Biolleyi*, especially if the apex of the frond is wanting. True *D. megalodus* has a distinct terminal pinna similar to the lateral ones and is exindusiate. METTENIUS says that he has seen indusium in *D. megalodus* (Fil. Lechl. II. 21.), but the specimens examined by him (now in B) all belong to *D. nephrodioides*.

Specimens seen:

Trinidad: HART nr. 3771 (W), 4120 (C); FENDLER nr. 21 (W); PREUSS nr. 1463 (B); BROADWAY nr. 3648 (RB).
 St. Vincent: H. H. and G. W. SMITH nr. 858 (C); EGGERS nr. 6641 (W).
 Martinique: SIEBER Syn. Fil. exs. nr. 160 (B).
 Porto Rico: BALBIS (B); EGGERS nr. 974 b (B, RB).
 San Domingo: MAYERHOFF nr. 103 (B); PRENLELOUP nr. 727 (C); WRIGHT, PARRY and BRUMMEL sine num. (W).
 Cuba: Valley of Rio Bayamita, MAXON nr. 3973 (W) — Farallones of la Perla, MAXON nr. 4387 (W) — above Jaguey, Yateras, MAXON nr. 4415 (W) — Monte Verde, WRIGHT nr. 1010 pt. (S).
 Venezuela: Caracas, MORITZ nr. 50 (B) — Lower Orinoco, RUSBY and SQUIRES nr. 388 (B, W); STEVENS (W) — Puerto Cabello, APPUN nr. 29 (RB).
 Colombia: Sta. Marta, H. H. SMITH nr. 2690 (C).
 Ecuador: RIMBACH nr. 104 (R).
 Costa Rica: WERCKLÉ (C).
 Guatemala: Cubilquitz, Alta Verapaz, v. TUERCKHEIM, ed. J. DONN. SMITH nr. 8812 (W).

264. *Dryopteris leucophlebia* (Christ) C. Chr. Ind. 274. 1905. — Fig. 41 b.

Syn. *Aspidium leucophlebium* Christ, Bull. L'Herb. Boiss. II. 4: 961. 1904.

Type from Costa Rica, leg. WERCKLÉ 1904 (C!).

A most distinct species, in cutting not unlike *D. hastata*, but much larger, in pubescence like *D. megalodus*, but less cut. In the type specimen, the leaf differs in shape from the other species of this section, with which it otherwise best corresponds, by its upper pinnæ being sessile with a broad base, adnate to rachis, widest on the lower side, and upwards at least confluent with the hastate lobed apex, thus not having a distinct terminal pinna. Such a one, however, present in another specimen from Costa Rica, which otherwise does not at all differ. — Pinnæ (the lower ones shortly stalked and cuneate at base) about 20 cm long by 4 cm broad, shallowly lobed, pale-green, firmly herbaceous, apparently glabrous, but by using a strong lense both surfaces are seen to be furnished with scattered, microscopical 4—6 branched hairs, which are best seen on the costæ and costulæ beneath. Rachis very finely puberulous by sessile, branched, deciduous hairs. Lobes obtusely rounded, subfalcate, crenate. Veins 10—12, the two basal opposite ones anastomosing under

a subacute angle in an excurrent branch, to which the next 2—3 alternately joint, and which run to the base of a hyaline membrane, to which the following 3—4 veins run out. Sori medial, small; sporangia setose by 2—4 short, simple setæ. I have seen a trace of a small, ciliate indusium.

Costa Rica, without locality, WERCKLÉ 1904 and 1905 (C) — Jiménez, Llanos de Santa Clara, Comarca de Limón, 200 m, DONNELL SMITH nr. 5094 (W) — Suerre, Llanuras de Santa Clara, 300 m, DONNELL SMITH nr. 6928 (W).

265. *Dryopteris Poiteana* (Bory) Urban, Symb. Ant. 4: 20. 1903; C. Chr. Ind. 285.

Syn. *Lastrea Poiteana* Bory, Dict. class. 9: 233. 1826.

Polypodium crenatum Sw. Prod. 132. 1788; Fl. Ind. occ. 1661. Hk. Bak.

Syn. 315; Jenm. Bull. Dept. Jam. n. s. 4: 133. 1897 (non Forskål 1775).

Phegopteris crenata Mett. Fil. Lips. 84. 1856.

[PLUMIER, Fil. tab. 111].

The type of *Lastrea Poiteana* Bory I have not seen, but there is no reason to doubt that it is the same as *Polypodium crenatum* Sw., which was collected by SWARTZ in Jamaica (S!) and which I take for the type of the species.

A well-known species, well described by JENMAN (loc. cit.) and others. The creeping rhizome is naked or clothed with some few scales, which bear some furcate hairs on the edges. The lamina, consisting of 3—6 pairs of lateral pinnae about 4 cm broad and similar terminal one is more or less soft-hairy beneath, especially on costæ and veins, glabrous or with a few setæ on the veins above; hairs simple. Costules prominent, stramineous. Margins subentire, crenate or broadly and shallowly serrate, rarely lobed. Veins 6—8-jugate, distant, the lower 2—4 pairs up-curved and anastomosing under an acute angle and meniscioid, the next 2—3 pairs alternately united into a common branch or often interrupted before meeting the opposite vein. Sori a little below the middle of the vein; sporangia when young furnished by 4—6 long, simple hairs. In the same sorus one finds as well quite young sporangia as ripe ones and intermediate states.

D. Poiteana varies mainly in pubescence; some specimens are almost glabrous and then resemble *D. meniscioides*, others, especially the andine specimens, much hairy and difficult to distinguish from *D. Ghiesbreghtii*; still I think it possible to determine specimens of these three species by the venation; in *D. Poiteana* rarely more than 4 pairs of veins are meniscioid and meet under acute angles; in the two other species 8—10 or more pairs of veins are meniscioid and meet under broad angles, and their sporangia seem to be glabrous even as young.

Goniopteris Rivoirei Fée, Gen. 2535 1850—52; 11 mém. tab. 18 fig. 2 from Guadeloupe seems according to the figure and a specimen in (B) so named to be a small form of *D. Poiteana* with large sori. JENMAN believed it to be *D. obliterata*, while BAKER (Ann. of Bot. 5: 460. 1891) restored it as a species. It must, however, be remarked, that the two reduced figures of the whole plant of *Gon. Rivoirei* and

G. hastata on Fée's plates 18 f. 1—2 are confounded. — The veins of *G. Rivoirei* are not so upcurved as in typical *D. Poiteana*.

D. Poiteana has a wide distribution; it is found in most West-Indian islands and from Guatemala to Peru and Northern Brazil. I enumerate here some of the more important collector-numbers seen by me.

West-Indies. Trinidad: HART nr. 560 (C); Bot. Gard. Herb. nr. 36 (W); FENDLER nr. 20 (W); EGGERS (H) — Tobago: EGGERS nr. 5808 (W) — Grenada: EGGERS nr. 6114 b (C); SHERRING nr. 110 (W) — St. Vincent: EGGERS nr. 6650 (W) — Martinique: Père DUSS nr. 1565 (C, W), 4118 (W) — Dominica: EGGERS s. n. (W) — Guadeloupe: L'HERMINIER nr. 124 (B); Père DUSS nr. 16 (C; proliferous), 4069 b (W) — Montserrat: RYAN (H) — St. Croix: ISERT (H); RYAN (H); BØRGESEN (CC) — St. Thomas: (H) — Porto Rico: SINTENIS nr. 8751 (W), 5965 (C, W); EGGERS nr. 1342 (B, C); GOLL nr. 131, 315, 340 (W); A. A. HELLER nr. 6178 (W); Mr. and Mrs. HELLER nr. 612 (W); UNDERWOOD and GRIGGS nr. 887 (W) — Haïti: MEYERHOFF (B); WRIGHT, PARRY and BRUMMEL (W) — Jamaica: SWARTZ (S); HART nr. 237 (W); CLUTE nr. 245 (W) — Cuba: Pinar del Rio, PALMER and RILEY nr. 499 (W); Oriente, WRIGHT nr. 3963 (S).

Guatemala: Los Amates, Dept. Izabal, KELLERMANN nr. 4855 (W).

Honduras: San Pedro Sula, C. THIEME, ed. DONN. SMITH nr. 5686 (B, C, W).

Costa Rica: Matina, PITTIER nr. 9749 (W). — A variety with the sori close to the costule, multi-setose sporangia and the veins often interrupted, not confluent. — WERCKLÉ (CC).

Panama: Bocas del Toro, HART nr. 56 (W).

Colombia: Sta. Marta, H. H. SMITH nr. 1043 (C, Rg).

Ecuador: Andes quitenses, SODIRO (C) — El Recreo, EGGERS nr. 15123 (B, W) — Balao, EGGERS nr. 14207 (W).

Peru: Tabalosos, STÜBEL nr. 1088 (B).

Venezuela: Caripe, MORITZ nr. 57, 192, 197 (B) — San Julian, M. W. LYON (W) — Puerto Cabello, LANSBERG nr. 67 (B); FUNCK nr. 7 (B).

Guiana: Surinam, Paramaribo, KAPPLER nr. 1755 (B) — Cayenne, LEPRIEUR (B).

Brazil: Pará, Serra de Baturité, HUBER nr. G. 129 (C) — Bahia, SALZMANN (C); LUSCHNATH nr. 122 (B).

266. *Dryopteris meniscioides* (Liebm.) C. Chr. Ind. 277. 1905.

Syn. *Polypodium meniscioides* Liebm. Vid. Selsk. Skr. V. 1: 211 (seors. 59). 1849. Hk. Bak. Syn. ed. II. 314; Roviroso, Pteridografia del Sur de Mexico 241 pl. 41 (bona!).

Type from Mexico: Teotalcingo, Dept. Oajaca, leg. LIEBMANN nr. 2407 (H!). Besides the specimens of LIEBMANN's collection I have only seen one more from Chiapas, G. MUNCH nr. 149 (C).

Perhaps a variety of *D. Poiteana*, which does not seem to occur in Mexico. It differs 1) by its perfectly glabrous frond, which is rigidly membranous or subcoriaceous, 2) its crenate or very shallowly serrulate pinnæ, which are gradually narrowed from the middle to the base (in *D. Poiteana* the pinnæ have a short cuneate or rounded base), and 3) by venation. Veins 8—10-jugate, of which about the 8 pairs are meniscoid, but united under more acute angles than in the following species. Sori a little inframedial, small and not rarely oblong; sometimes 2 or even 3 sori are found on the same vein, and these being confluent the species resembles

a *Meniscium*. It is really an intermediate link between *Goniopteris* and *Meniscium* and therefore I agree with METTENIUS in reducing *Meniscium* to a subgenus of *Dryopteris*. The difference is found mainly in the position of sori; if the sori are born on the vein near the point, where two opposite veins unite, the two opposite sori become with age confluent and thus we have a meniscioid sorus. — *D. meniscioides* has 8–10 lateral pinnæ, about 20 cm long and 3¹/₂ cm broad. Their edges are cartilaginous, a little thickened and sparsely ciliate. — *Goniopteris rostrata* Fée, referred hereto in my Index, belongs to *D. glandulosa*.

267. *Dryopteris Ghiesbreghtii* (Linden) C. Chr. Ind. 267. 1905.

Syn. *Polypodium Ghiesbreghtii* Linden; Bak. Syn. 315. 1867.

Goniopteris mollis Fée, Gen. 252. 1850–52; 11 mém. tab. 24 fig. 1. 1866.

Polypodium crenatum Hk. Fil. exot. tab. 84. 1859.

Type from Mexico: Teapa, Tabasco leg. LINDEN nr. 1499 (B!).

A larger plant than *D. Poiteana* with only 2–5 pairs of lateral sessile pinnæ, which are 20–30 cm long by 5–8 cm broad, from subentire to irregularly serrulate or lobed. Stipe 3–4 dm long, raised from a creeping, nearly scaleless rhizome, glabrous. Pinnæ slightly strigose on the veins above, densely soft-hairy beneath. Costæ and costules as a rule not stramineous. Veins in 10–12 pairs, all, the 2–3 uppermost pairs excepted, anastomosing under broad angles, generally all meniscioid. Sori about medial on the vein, in some specimens distinctly inframedial, in others nearer the anastomosing point. Sporangia glabrous even as young but intermixed with long hairs from the receptacle.

Apparently a very distinct species when only the typical form is considered, but it is not always easy to distinguish from the andine forms of *D. Poiteana*. The best characters is the venation and the glabrous sporangia. The species is confined to Central-America, from Southern Mexico to Costa Rica, a region where *D. Poiteana* does not occur (Mexico) or is rare. I have seen the following specimens besides numerous cultivated ones.

Mexico: Tabasco, LINDEN nr. 1499 (B); ROVIROSA nr. 575 (W).

Guatemala: Alta Verapaz, Cubilquitz, v. TUERCKHEIM, ed. DONNELL SMITH nr. 8648 (C, W), II 876 (W); Sacolal, v. TUERCKHEIM ed. DONN. SMITH nr. 1407 (W); Chamiquin, v. TUERCKHEIM nr. 550 (W); near Finca Sepacuite, COOK and GRIGGS nr. 281 and 664 (W); Secanquim, MAXON and HAY nr. 3132 (W); Puerto Barrios, CHAS. C. DEAM nr. 450 (W); near Cacao, BARBER nr. 194 (W).

Nicaragua: Canada Yasira, Dept. Metagalpa, E. ROTHSCHUH nr. 117 (B).

Costa Rica: Talamanca, TONDUZ nr. 8659 (W); Hacienda de Guacimo, TONDUZ nr. 14572 (W); Puerto Viejo, PITTIER nr. 7503 (W); Jiménez, ALFARO nr. 157 (W), 16517 (C); Port Limon, COOK and DOYLE nr. 419 (W); Río Hondo, COOK and DOYLE nr. 496 (W).

Unknown species of *Goniopteris*.

1. *Goniopteris macrocladia* Fée, Cr. vasc. Brés. 1: 106 tab. 33 right-hand figure ("fig. 1"). 1869 — Brazil: Sta Catharina, ALBURQUERQUE. It seems to be distinct from all Brazilian species known to me.
2. *Nephrodium nemorale* Sodiro, Cr. vasc. quit. 267. 1893; *Dryopteris nemoralis* C. Chr. Ind. 279 — Ecuador.
3. *Polypodium Urbani* Sod. l. c. 301; *Dryopteris Urbani* C. Chr. Ind. 299 — Ecuador.
4. *Aspidium hemiotis* Christ, Hedwigia 45: 191. 1906 — Amazonas.

Subgenus 10. *Meniscium* (Schreber).

The old genus *Meniscium* is a well-known and apparently one of the most distinct groups of ferns. The species from the Old and the New World referred to it are, however, certainly not very close relatives, and I now firmly believe that they are even not congeneric, and, moreover, that the American species can not be generically separated from *Goniopteris*. In this view I agree with METTENIUS (see Fil. Lechl. II. 19). Within the second group of *Goniopteris*, *Eugoniopteris*, we find an unbroken row of species, from free-veined species to such species as *D. Ghiesbreghtii* and *D. meniscioides*, the venation of which is perfectly meniscioid. The other important character of *Meniscium*: the confluent sori, also is insufficient as distinguishing mark between *Goniopteris* and *Meniscium*. Two species as *D. meniscioides* and *D. ensiformis* described below are really so closely related that it should be very unnatural to place them in two different genera. Still I have failed to find stellate hairs in all species of *Meniscium* and this together with the whole uniform character of the species justify the segregation of the species from the subgenus *Goniopteris* and the referring of them to a proper subgenus, *Meniscium*. If one should prefer to separate both these subgenera from the others, they should certainly be united into a single genus.

The Old World's species of *Meniscium*, as commonly understood, are considerably different from the American ones, and I have no doubt that they must be referred to *Cyclosorus* being a specialized group of that subgenus. Thus the two subgenera (or genera) *Cyclosorus* and *Goniopteris* includes each a series of species, from free-veined forms to such having meniscioid venation. The American species of *Cyclosorus* do not show a venation intermediate between the simple, goniopteroid venation of *D. mollis* and meniscioid veins, but such forms we find in Asia. I shall here only refer to such forms as *Polypodium urophyllum* Wall. and *Meniscium cupidatum* Bl.

My material of the American species of *Meniscium* is not so comprehensive as that of the other subspecies of *Dryopteris*. I can not, therefore, give here a review of the species. The group is represented in America by perhaps a dozen species,

not a few of the forms in Ind. Fil. referred to *D. reticulata* being valid species. METTENIUS (Fil. Leschl. II. 21—25) has given a review of the species known till 1859; and I can, as far as I know the species, fully agree with his treatment. Since then several species have been described, and below I describe two others as new, the first of these being an interesting intermediate between the true species of *Meniscium* and *D. meniscioides* belonging to *Goniopteris*.

268. *Dryopteris ensiformis* n. sp. — Fig. 46.

Type from Costa Rica: Lisières des pâturages à La Palma, 1459 m, leg. Ad. TONDUZ nr. 12533 (C).

Rhizomate? Stipitibus ad basin 2 cm crassis, ad 1 m longis, glabris. Lamina visa incompleta, pinnata, omnino glabra, coriacea, brunneo-viridi. Pinnis inter se 6 cm remotis, ensiformibus, 30—35 cm longis, ad 5 cm latis, apice caudata, basi abrupte rotundata, subcordata subsessilibus, infra aërophoro instructa (?); marginibus irregulariter repandulis, cartilagineis. Venis secundariis 4 mm circiter inter se remotis, curvatis, tertiariis simplicibus, 10—12-jugis, omnibus more *Meniscii* anastomosantibus; radiis late clavatis, liberis vel saepe omnibus confluentibus venam venis secundariis paralellam formantibus. Soris parvis, atrorufis, in venis medialibus, rotundis, raro confluentibus, exindusiatis. Sporangia receptaculisque glabris.

This new species is a peculiar fern, in general habit a *Meniscium*, but in venation and sori not unlike *D. meniscioides*, from which it differs by the much closer secondary and tertiary veins and by the subcordate base of the pinnæ, which have nearly the same breadth from base to short of the apex. It also resembles *D. (Meniscium) Andreana* (Sod.) C. Chr., which in sori is a true *Meniscium*. The most remarkable features of our new species are 1) the presence of an aërophore, 2) the edges of the pinnæ and 3) the venation. Ad 1). At the insertion of the costæ is to be found a large, blackbrown spot, which evidently is the scar of a fallen aërophore. Ad 2). The pinnæ are bordered by a broad, cartilagineous line. Ad 3). The excurrent veinlet formed by two anastomosing veins is always much longer than found in other species of *Meniscium*; often it reaches nearly to the next cross-vein and then ends in a broad clavate apex, in which a brown, oblong pellucid spot is seen on the upperside; but often the veinlet is continued to the next cross-vein and the veinlets between two secondary veins then together form a continued vein parallel to the secondary veins. In this case the veinlets are thickened above the middle and enclose a brown pellucid spot as described, above which they again narrow.

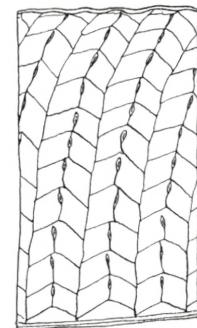
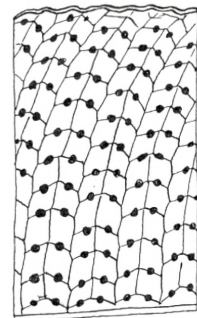


Fig. 46. Fragments of *D. ensiformis* n. sp. seen from both surfaces $\times 1\frac{1}{2}$.

269. *Dryopteris Andreana* (Sod.) C. Chr. Ind. 252. 1905.

Syn. *Meniscium Andreanum* Sodiro, Rec. 71. 1883; Cr. vasc. quit. 392. 1893.

Type from Ecuador, Andes quitenses, leg. SODIRO (C!).

Closely related to the preceding species, but its sori all meniscioid, the base of the sessile pinnæ not subcordate but bluntly rounded with the lower side of the upper pinnæ adnate to rachis, without aërophore (?), rachis, costæ on both sides and secondary veins beneath sparsely pubescent by very short, simple hairs and the venation somewhat different. Secondary veins at distances of 4–6 mm with about 17–18 transverse, close and rather convex tertiary veins; the free, included veinlet short, rarely extending beyond the middle of the areole, sometimes nearly obsolete, its apex seen from above often broadly clavate as in *D. ensiformis*. Receptacle glabrous. — Pinnæ 20–40 cm long, 5–7 cm broad (18–24 by 3–5 cm according to SODIRO). — The species is not very near *D. reticulata*.

270. *Dryopteris pachysora* Hieron. Hedwigia 46: 351 tab. 7 fig. 19. 1907.

Type from Ecuador, Mt. Abitagua, STÜBEL nr. 897 (B!).

Differs from *D. Andreana* but agrees with the following two species by its long-stalked pinnæ with a subequally cuneate base. Transverse veins 12–14, the free veinlets long, extending beyond the middle of the areole, its apex scarcely clavate, or occasionally reaching the next cross-vein. The confluent sori very short and thick. Costæ above very sparsely setose, the leaf otherwise glabrous.

271. *Dryopteris falcata* (Liebm.) C. Chr. comb. nov.

Syn. *Meniscium falcatum* Liebm., Vid. Selsk. Skr. V. 1: 183. 1849.

Phegopteris falcata Mett. Fil. Lechl. II. 23. 1859.

Meniscium Jungersenii Fée, Gen. 223. 1850–52; Fourn. Mex. Pl. 1: 73 (as *Jurgensenii*).

Type from Mexico: Depart. Oajaca, Lacobe, LIEBMANN (H!). Also Costa Rica, Buenos Ayres, PITTIER nr. 4839 (C).

A very large species, widely different from typical *D. reticulata*. Rachis angular, glabrous, brownish-stramineous. Pinnæ linear-elongate, 40 cm long, 3½ cm broad, dark-green, thinly membranous, apex long acuminate, margins undulato-crenulate, base subequally cuneate, long-stalked (petiole 2–2½ cm long), upper surface, the very sparsely setose costa excepted, glabrous, costa beneath short-hairy. Secondary veins at distances of about 3 mm with 12–13 transverse, a little convex veins; the included veinlets as a rule free but terminating in a subclavate apex above the middle of the areole, or not rarely prolonged and united with the next cross-vein. Sori small, nearly round, placed at the base of the free veinlet. Receptacle glabrous.

Differs from *D. pachysora* by its much longer pinnæ of thinner texture, the costæ hairy beneath and its small sori, from *D. reticulata* by its long and long-stalked pinnæ with a cuneate, subequal base, pubescent costæ and short sori.

272. *Dryopteris lingulata* n. sp.

Syn. *Phegopteris Andreana* Christ, Prim. Fl. Costar. 3: 35. 1901.

Type from Costa Rica: Forêts de la vallée du Rio Hondo près Madre de Dios, 200 m, leg. PITTIER nr. 10349 (C).

Rhizomate? Stipite incompleto 60 cm longo, griseo, glabro, anguloso. Lamina 60—70 cm longa, chartacea, laete-viridi, costis supra minute puberulis exceptis omnino glabra, impari-pinnata. Pinnis lateralibus, 5-jugis, 12 cm inter se remotis, lingulatis seu elliptico-lanceolatis, 30—35 cm longis, medio 7 cm latis, caudato-acuminatis, marginibus undulatis, subintegris inferioribus, petiolo 2—4 cm longo stipitatis, basi cuneata, supremis sessilibus basi inferiore ad rachin adnata, superiore rotundato-cuneata. Venis secundariis 6—8 mm inter se distantibus, tertiariis 16—17 inter se 3 mm remotis convexis; venulis liberis apice late clavato ultra medium areolae in parenchymate desinentibus, seu ad venam transversam superiorem productis. Soris lunatis, angustis, saepe 4—5 mm longis. Receptaculis glabris.

Differs from the two preceding species, which it resembles by the long-stalked inferior pinnæ with a cuneate base, by the shape of the pinnæ and its long, narrow, convex sori. A single pinna resembles not a little an entire, small leaf of *D. gigantea*, from which it differs by its glabrous rachis and costæ beneath.

273. *Dryopteris gigantea* (Mett.) C. Chr. Index 267. 1905.

Syn. *Meniscium giganteum* Mett. Fil. Lechl. 1: 19. 1856.

Type from Peru: St. Gavan, LECHLER nr. 2292 (B!, S). Other specimens from Ecuador, SODIRO (C), Columbia, Costa Rica, PITTIER nr. 1163 and 9448 (C).

Well-marked by its entire frond, hairy midrib and principal veins, and by the cross-veins being covered with sporangia from end to end. It appears that the species also can be pinnate with 1—3 pairs of lateral pinnæ.

The following forms, in Index Fil. referred to *D. reticulata*, are certainly good species (for synonymy see Ind. Fil.).

274. *Dryopteris reticulata* (L.) Urb.

The typical form of this is West-Indian, but very similar forms are found in Central-America. In Brazil the species scarcely occurs.

275. *Dryopteris sorbifolia* (Jacq.) Hieron. Hedwigia 46: 350. 1907.

Area: Mexico along the Andes to Peru.

HIERONYMUS refers to this species *Meniscium arborescens* Willd. and *M. Kapplerianum* Fée and he regards *Phegopteris mollis* Mett. as a variety.

276. *Meniscium macrophyllum* Kze. — Bahia and Guiana.277. *Phegopteris membranacea* Mett. — Peru, LECHLER nr. 1785.

278. *Dryopteris longifolia* (Fée) Hieron. *Hedwigia* 46: 351. 1907.

Meniscium longifolium Fée, *Cr. vasc. Brés.* 1: 84 tab. 25 fig. 2 (an *Desv. Prodr.* 223. 1827). — Brazil, GLAZIOU nr. 1747 (C) and several other specimens.

This is not very near *D. reticulata*; it resembles in general habit *D. falcata*, but the petioles of the pinnæ are shorter and their base rounded or very shortly cuneate, the main difference is, however, the pubescence. The underside is finely pubescent throughout and the receptacle is rather densely setose. By this last character it differs from all species mentioned above but agrees with a specimen from Plateau de Goyaz, GLAZIOU nr. 22631 (C), which probably belongs to an undescribed species. It is scarcely different from *D. longifolia* in pubescence, in shape of pinnæ it resembles closely typical *D. reticulata*. A third form, also from Goyaz, GLAZIOU nr. 22633 (C) has similarly pilose receptacles but long, narrow pinnæ not unlike those of *D. angustifolia*.

The following two species have always been considered good species.

279. *Dryopteris angustifolia* (Willd.) Urban.

West-Indies, Honduras, Ecuador.

280. *Dryopteris serrata* (Cav.) C. Chr. *Ind.* 291.

Brazil, Guiana, Costa Rica—Ecuador.

Unknown to me are

Meniscium Salzmanni Fée, *Gen.* 223 — Bahia.

M. chrysodioides Fée, *Gen.* 225 — America austr., coll. PAMPLIN 55.

M. elongatum Fée, *Cr. vasc. Brés.* 1: 83 tab. 25 fig. 1. 1869 — Brazil, GLAZIOU 1169.

M. sessilifolium Pohl; Fée, *l. c.* 84 — Brazil, POHL.

Unknown species of uncertain position.

The descriptions of the following species are too short or do not mention such characters, which might indicate the right position of the species described in my classification.

1. *Goniopteris lucida* Fée *Gen.* 253 — Guadeloupe.
2. *Phegopteris ciliata* Fée, *Gen.* 248 — Cuba, LINDEN nr. 270.
3. *Aspidium tenuiculum* Fée, *Gen.* 292 — Cuba?, LINDEN nr. 2.
4. *Phegopteris amplificata* Fée, 8 mém. 89 — Mexico, SCHAFFNER nr. 219.
5. *Phegopteris melanorachis* Fée, 8 mém. 91 — Mexico, SCHAFFNER nr. 238.

Known as sterile only; probably an *Alsophila*.

6. *Aspidium cheiloptium* Fée, 8 mém. 103 — Mexico, SCHAFFNER (nr. 499 t. FOURN.).

7. *Aspidium Van Heurckii* Fourn. Pl. Mex. 1: 97 — Mexico, BOTT. nr. 1461 “Differt a præcedente (*A. Kunzei* Fée = *Dryopteris cheilanthoides* var. *resinoso-foetida*) indusio villosa”, the whole “description”.
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Additional notes to § 1 Eudryopteris.

- (1) Recently I have received from Dr. H. Ross, Munich, a copy of his paper: Contributions à la flore du Mexique (Société scientifique “Antonio Alzate”, Mémoires **32**. 1912), wherein my new species *Dryopteris Rossii*, mentioned above pag. 72, is described on pag. 179 and figured on plate XII.
- (2) To § *Eudryopteris* belong our common European *D. spinulosa* with its subspecies *dilatata*. A specimen of the subspecies was collected by Mrs. VALENTINER in 1909—1911 on the Falkland Islands. The specimen, which I have seen (Kew), is so exactly like our commonest North-European form, that I am nearly convinced, that the species was introduced into the far Islands.
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Names of accepted species in italics. An asterisk before the name indicates that the species is illustrated in the present work or in my other papers on American *Dryopteris*. In the following list both the number of the species and the page are quoted. The names without reference to page are synonyms, which are to be found in my earlier papers. *Aspidium lasiesthes* Kze, f. inst., is a name not found in the present work; the figure 84 below indicates that the name is a synonym of species nr. 84 *D. oligocarpa*. Under this species we find (p. 136) a reference to "Revision nr. 5", where the synonym is quoted.

	Nr.	Pag.		Nr.	Pag.		Nr.	Pag.
Alsophila			Aspidium			Aspidium		
<i>pilosa</i> Mart et Gal.	160	148	<i>Biolleyi</i> Christ	248	248	<i>dissidens</i> Mett.	218	222
Amauropelta			<i>brachynevron</i> Fée	13	78	<i>elatior</i> Fée	108	
<i>Breutelii</i> Kze.	149		<i>Breutelii</i> Mett.	149		<i>eriocaulon</i> Fée	40	102
Aspidium			<i>Caesianum</i> Christ.	236	238	<i>eriosorum</i> Fée	136	
<i>abruptum</i> Kze.	196	189	<i>Capitainii</i> Fée	179	164	<i>exsudans</i> Fourn.	67	
<i>abruptum</i> Mart. et Gal.	190	176	<i>caripense</i> Mett.	34	95	— v. <i>myriocar-</i>		
<i>achalense</i> Hieron.	139		<i>catacolobum</i> Kze.	245	244	<i>pum</i> Fourn.	154	147
<i>agatolepis</i> Fée	6	69	<i>caudatum</i> var. <i>con-</i>			<i>falculatum</i> Raddi	32	91
<i>albicaule</i> Fée	195		<i>tractum</i> Christ	23		<i>Fendleri</i> Eat	189	173
<i>Alfarii</i> Christ	85		<i>cheiloptium</i> Fée	272		<i>Fischeri</i> Mett.	156	
<i>alsophilaceum</i> Kze.	31	90	<i>chrysocarpon</i> Fée	3	67	<i>flaccidum</i> Fourn.	4	68
<i>amaurolepis</i> Fée	33	93	<i>chrysolobum</i> Klf.	32	91	<i>Francoanum</i> Fourn.	207	209
<i>anopterum</i> Kze.	226	229	<i>coadunatum</i> Klf.	245	246	<i>Fraseri</i> Mett.	252	252
<i>apertum</i> Fée	8	71	<i>coarctatum</i> Kze.	65		<i>frigidum</i> Christ.	101	
<i>Arechavaletae</i> Hieron.	135		<i>confluens</i> Fée	156		<i>Funckii</i> Mett.	102	
<i>argentinum</i> Hieron.	83		<i>consanguineum</i> Fée	59		<i>Galanderi</i> Hieron.	98	
<i>asperulum</i> Fée	179	164	<i>conspersoides</i> Fée	195		<i>Germani</i> Fée	190	180
<i>asplenioides</i> f. <i>exin-</i>			<i>conspersum</i> Fée	198	190	<i>geropogon</i> Fée	193	185
<i>duciatum</i> Kuhn	227	230	<i>conspersum</i> Kze.	190	176	<i>Ghiesbreghtii</i> Fourn.	67	132
<i>asplenioides</i> varr. <i>por-</i>			<i>conterminum</i> Willd.	63		<i>glanduliferum</i> Karst.	140	
<i>tencense</i> et <i>subpin-</i>			<i>costale</i> Mett.	185	169	<i>Glaziovii</i> Christ.	162	
<i>nata</i> Kuhn et Christ	211	213	<i>crinitum</i> Mart. et Gal.	3	67	<i>gleichenioides</i> Christ.	154	148
<i>athyrioides</i> Mart. et			<i>ctenitis</i> Link	33	93	<i>goggilodus</i> Schkuhr.	201	193
<i>Gal.</i>	6	69	<i>Cumingianum</i> Kze.	206	208	<i>guadalupense</i> Christ	248	248
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